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A contribution to a revision of the North American Hydnaceae

Howard James Banker

The following paper is intended to include a revision of all the pileate forms of the family of the Hydnaceae which have been found on the continent of North America and its adjacent islands north of the Isthmus of Panama. A few resupinate forms have been included by reason of their close relationship to pileate forms, but in general they have been excluded. The reason for this arbitrary limitation of the scope of the work is the impossibility of adequately treating the resupinate forms and referring them to their proper species until such time as the Berkeley types can be thoroughly examined by one familiar with our American plants.

The Hydnaceae represent one of the smaller families of the Basidiomycetes, there being not more than five hundred known species in the family, and of these not more than two hundred have been reported within the geographical limits of this paper. With a few exceptions the species are not common and generally appear to be quite local in distribution. The task, therefore, of getting suitable material on which to base a revision of the family has proved more difficult than was at first anticipated. Nor are the herbaria of collectors as helpful as one would have a right to expect. The published descriptions of species of this family are frequently incomplete and inadequate to fully discriminate the species, so that it is possible often to include several different species under the one description. Collectors are inclined to refer specimens according to some conspicuous feature, such as a scaly pileus or a zonate pileus, and then pay little attention to other apparently minor characters. Owing to the local character of the distribution of these plants, combined with the comparative rarity with which they are found, few discover that the plants which they are referring to a given species are very different from the plants

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which others are referring to the same species. Moreover, assuming that the species is common and well known, no field notes are considered necessary. As a result much confusion has arisen in our conception of these species. Occasionally mycologists, who have received specimens from all parts of the country, have noted that certain species present remarkable variations, but as the material thus received is usually fragmentary, without suitable notes, and is received only at rare intervals, they have generally contented themselves with noting that the form is an unusual one.

In the extensive collections of the New York Botanical Garden, brought together from very many different sources, the confusion in species is very evident. This is conspicuously seen in the forms referred to *Hydnum imbricatum* L. and *H. zonatum* Batsch. As to the former species, nearly everything with a scaly pileus has been referred to it, while the latter has been made to include almost everything with a zonate pileus.

While herbarium specimens often clearly show that they represent distinct species, so great is the change that these plants undergo in the process of drying that one rarely feels justified in attempting a description of new species from such material without satisfactory field notes. On the other hand the securing of fresh material or at least of ample and accurate field notes is a difficult and discouraging task. During six years of careful watching for specimens of the *H. imbricatum* allies, it has been the writer's fortune to find but two of the scaly-capped forms in the field; likewise but one of the forms commonly referred to *H. zonatum* has come within his observation. Of more than forty specimens found in the herbaria referred to these two species, not one was accompanied by descriptive notes that were of any value. Yet we have at least a half dozen good species here represented, could the distinctive characters be clearly established.

The species of this family are not only comparatively rare and local in distribution but they are often intermittent in appearance. The writer once found three different species in a space not over ten feet square, and a fourth in the same woods a short distance away. But not one of the four was found anywhere in that region in the next four successive years, although the ground was searched over repeatedly each year.

DISTRIBUTION

The geographical distribution of these plants appears to be largely influenced by latitude. But collections of basidiomycetous fungi from the region west of the Mississippi river have been so few and incomplete that general conclusions respecting distribution in this region can not be confidently drawn. The following areas may be recognized as possessing each a characteristic and somewhat distinctive hydnaceous flora. (1) The northeastern United States south to North Carolina and Tennessee and west to the Great Plains. (2) The Southern States west to Louisiana. (3) The Gulf region including the West Indies and the immediate borders of the Gulf. (4) The north Pacific Coast including Oregon and Washington. It seems probable that Canada and northern New England to Greenland may represent another distinct floral distribution, but collections in this region have been too meager to suggest more than a possibility. These remarks on distribution are based on specimens actually seen by the writer and do not include the various species reported in catalogues and local floras without accompanying specimens. The material examined has come chiefly from the following states: Maine, Massachusetts, Connecticut, New York, New Jersey, West Virginia, Ohio, Indiana, Kentucky, Alabama, Louisiana, Cuba, Honduras, Oregon, Washington. It will be seen therefore, that there are large areas of the country that have been scarcely explored for members of this group of plants. Even in the states quoted the collections are often from one or two localities only; thus Maine is represented only by collections at Orono and Mt. Desert, Ohio by collections in the Miami Valley, Indiana by work in the vicinity of Greencastle, and Alabama by collections made near Auburn. This study of distribution cannot be satisfactorily supplemented by published local floras, for in consequence of the confused conception of species in this family such lists are wholly unreliable except when verified by actual specimens and these are often lacking. A comparison of two collections on which such floras have been based, quickly reveals how utterly untrustworthy are these lists of species as a means of determining distribution. The plants referred to *Hydnum imbricatum* by Alabama collectors are totally distinct from the plant referred to the same species by the

New England botanists. Professor Earle has noted that *Hydnum repandum* as collected by him in Connecticut was a very different thing from the plant of that alliance with which he had been acquainted in Alabama.

It is hoped that the present contribution may lead to a clearer conception respecting the species of this family and be a means of stimulating a more exact study of the distribution of these plants. It can hardly be expected that all confusion has been removed or that all errors have been avoided. The source of many of our present difficulties is to be traced back to the work of early European botanists, whose material is either inaccessible or has long since passed into an irrecoverable oblivion. The author believes that in the majority of cases, with respect to the species included in this paper, he has formed a clear conception of them in his own mind and has endeavored to present that conception as definitely and distinctly as he was able in the accompanying descriptions and synopses. Whether he has in all cases made an absolutely correct determination, especially in the case of species referred to old European types, he cannot state with complete confidence.

NOMENCLATURE

In the determination of questions of nomenclature we have conformed closely to the Philadelphia code.* There is a case of a peculiar character, however, which needs some further comment. In 1878 M. C. Cooke and L. Quélet published together a *Clavis Synoptica Hymenomycetum Europaeorum.* This work was based upon Fries' *Hymenomycetes Europaei* and followed his classification. In connection with the subgroups of the genus *Hydnum* there were published in parentheses the generic names *Sarcodon*, *Calodon*, *Pleurodon*, and *Dryodon* ascribed to Quélet. It has been customary among botanists to regard this work as the place of origin of Quélet's genera. But the names of the species in each group were not made to agree in gender with these names but continued in agreement with *Hydnum* which was printed as the name of the genus. There were, therefore, no binomial combinations of these genera published in this work and hence the genera were not published according to our accepted rules.

* *Cf.* Bull. Torrey Club 31 : 249.

While in general it is not difficult to decide to what groups of species Quélet intended his generic names to apply, the name *Sarcodon* is so placed as to be made to include also the next genus *Calodon*. The whole work is nomenclatorially unfortunate and sets at defiance all system or rules of publication. It cannot, however, be ignored, for later writers including Quélet himself have taken up these names and treated them as established genera. In 1881 P. A. Karsten in an *Enumeratio Hydnearum Fr. Fennicarum, Systemate novo dispositarum*, published in the Revue Mycologique 3[1]: 19, recognized Quélet's genera and republished them with species properly assigned under each, in so doing setting aside his own genera *Auriscalpium*, *Hydnellum* and *Friesites* published in 1879, in recognition of Quélet's priority. This paper of Karsten thus becomes technically the place of publication of the genera *Sarcodon*, *Calodon*, *Dryodon* and *Pleurodon* of Quélet.

The correct citation, therefore, of these genera with their types is as follows :

Dryodon Quél.; Karst. Rev. Myc. 3[1]: 19. 1881.
D. coralloides (Scop.) Karst.
Sarcodon Quél.; Karst. Rev. Myc. 3[1]: 20. 1881.
S. imbricatus (L.) Karst.
Calodon Quél.; Karst. Rev. Myc. 3[1]: 20. 1881.
C. suaveolens (Scop.) Karst.
Pleurodon Quél.; Karst. Rev. Myc. 3[1]: 20. 1881.
P. auriscalpium (L.) Karst.

Three of the above genera as thus determined becomes synonyms as follows :

Dryodon = *Hericium* Pers.
Calodon = *Hydnellum* Karst.
Pleurodon = *Auriscalpium* S. F. Gray.

Synopsis of Genera

Teeth evident, averaging 0.5 mm. or more in length, more or less awl-shaped, sometimes compressed.
Spores smooth, white or hyaline ; plants usually light-colored, white to reddish or gray.
Plants mesopodous, terrestrial, fleshy, white, red or yellow. 1. *Hydnum*.
Plants not mesopodous, epixylous.

Plant body more or less tuberculiform or branched, the branches subterete or angular, fleshy or subfleshy, white to reddish or yellowish. 2. *Hericium.*

Plant body not tuberculiform, usually dimidiate to subresupinate, often confluent-imbricate, if branched the branches flattened or flabellate.

Hymenium smooth; plants tough to subfleshy, white or ochraceous to gray. 3. *Steccherinum.*

Hymenium with cystidia; plants hard, woody, reddish. 4. *Echinodontium.*

Spores roughened; plants commonly dark colored, usually terrestrial.

Spores coarsely tuberculate, colored (pale in *H. reticulatum*); plants usually mesopodous and dark colored.

Plants fleshy, brittle. 5. *Sarcodon.*

Plants fibrous, tough. 6. *Hydnellum.*

Spores minutely papillose or echinulate, white or hyaline; plants usually tough, fibrous.

Spores echinulate; plants mesopodous, often light colored. 7. *Phellodon.*

Spores papillose; plants sessile or with a lateral stipe, dark colored at least with age.

Plant body of branched processes, sessile or resupinate. 8. *Leaia.*

Plant body normally pileate, stipitate; stipe lateral. 9. *Auriscalpium.*

Teeth minute, less than 0.25 mm. in length; plant body pileate, thin, subsessile. 10. *Grandinioides.*

The above synopsis, it will be observed, is based primarily on spore characters. While this is not a convenient basis for practical field work especially as in some cases a one twelfth oil-immersion is found necessary to make out the spore markings, yet these characters appear to be very definite and fundamental in the separation of genera, and have, therefore, been employed. Other and more evident characters have been added as fully as possible but it must be borne in mind that these are subject to many exceptions or at least modifications.

1. HYDNUM L. Sp. Pl. 2: 1178. 1753

Sistotrema Persoon, Neues Mag. für die Bot. 1: 108. 1794.
Hypothele Paulet, Icon. des Champ. *pl. 35.* 1800?
Dentinum S. F. Gray, Nat. Arr. Brit. Pl. 1: 650. 1821.
Tyrodon Karsten, Rev. Myc. 3^1: 19. 1881.

Plants terrestrial, mesopodous, medium to small size, less than 10 cm. wide, light colored (white or shades of yellow and red), never tomentose, sometimes pubescent; substance fleshy, usually

brittle when fresh; teeth pale yellowish or reddish, often white when young, terete or flattened; spores white or yellowish, oblong, ovoid or subglobose, often more or less angular, usually smooth, often apiculate, generally with one or more small guttulae.

Hydnum repandum is probably the oldest and most commonly known, as well as the most widely spread, species of the family. It is altogether probable that it is the plant referred to by Bauhin, *Historiae Plantarum Universalis* 3: 828. 1651. It is also undoubtedly the plant figured and described by Dillenius, *Catalogus Plantarum circa Gissam nascentium*, 188, *pl. 1.* 1719, upon which he founded the genus *Erinaceus*, the prototype of *Hydnum.* When, in 1753, Linnaeus adopted his binomial system of nomenclature, this species, although not placed first in his list, represents the nomenclatorial type of his genus *Hydnum*, according to the interpretation of the principle of generic types by the code here followed.

Hypothele Paulet was the first genus actually carved out of the Linnaean *Hydnum*, but was founded on the same type, *H. repandum* L. Paulet's original work* does not appear to have had a very wide distribution or to have been very generally known; not until after its republication by Leveille in 1855 do we find the European mycologists apparently acquainted with it. In 1821 S. F. Gray, in his Natural Arrangement of British Plants 1: 650, evidently unaware of the work of Paulet, founded the genus *Dentinum* on *H. repandum* L. and *H. rufescens* Pers., making an exact duplicate of *Hypothele* Paulet. Gray's work, following as it did the natural system of Jussieu, did not meet with an enthusiastic reception by his fellow-countrymen, and thus failed to receive the recognition and circulation that it deserved, so that as late as 1881 Karsten, in the Revue Mycologique 3^1: 19, apparently ignorant of the work both of Paulet and of Gray, separated the species *H. repandum* L. and *H. rufescens* Pers. again as a genus and gave to it the name *Tyrodon.* The plants thus distingished stand in marked contrast with other members of the family and seem to fully justify the opinion of these three eminent botanists who so

* The text of Paulet's Icones des Champignons was published in 1793 but does not contain a reference to *Hypothele.* This name appears only on the plate cited. The plates were issued later than the text in a series of fascicles, the last twelve of which appeared after Paulet's death, which occurred in 1826.

curiously concurred in regarding them as constituting a distinct genus.

The genus *Sistotrema* was established by Persoon on *S. confluens* as the type. The only character by which this genus appears to be separated from *Hydnum* is that of the flattened teeth, and considering that this character is frequently present in *H. repandum*, it seems to be a wholly insufficient ground for the separation of the genus. This generic name is older than *Hypothele*.

Synopsis of the Species

Spores small, less than 6 μ in diameter; the entire plant generally white to cream colored.
- Pileus viscid, at least when young, as shown by adhering leaves.
  - Plants large, 5–13 cm. wide, not confluent; stem stout; pileus not deeply depressed. 1. *H. albo-magnum.*
  - Plants small, less than 3 cm. wide, confluent; stem slender; pileus more or less infundibuliform. 6. *H. sublamellosum.*
- Pileus dry; plant small, less than 6 cm. wide, turning yellow to brown when cut or bruised. 2. *H. albidum.*

Spores large, more than 6 μ in diameter; plant yellowish buff or reddish.
- Plants turning yellow when cut or bruised, generally caespitose; stem as long as the width of the pileus. 4. *H. caespitosum.*
- Plants not turning yellow when bruised, solitary or gregarious, rarely caespitose; stems usually shorter than the width of the pileus.
  - Teeth decurrent half way down the stem; substance somewhat tough. 5. *H. washingtonianum.*
  - Teeth scarcely decurrent; flesh brittle. 3. *H. repandum.*

1. HYDNUM ALBO-MAGNUM Banker, Bull. Torrey Club 28: 207. 1901

A low, broad, fleshy plant usually pure white throughout though sometimes lightly tinted, turning yellowish in drying. Pileus uneven, repand, viscid when young, probably subglabrous in age, reaching 10 cm. or more in width; flesh white, brittle, and mealy; stem short, thick, central, or excentric, often with bulbous base, its length not more than half the width of the pileus, the plant often appearing nearly sessile; teeth white, slender, crowded, about 3 to one millimeter, acute almost bristle pointed, 2–4 mm. long, subdecurrent; spores white or hyaline, oblong-ovate, obliquely apiculate, smooth, with one or more small guttulae, small, 3.5–4 by 5.5–7 μ; taste mild, somewhat mealy.

HAB.: In mixed woods. Nov.–Jan.

RANGE: Alabama, *Earle.*

The plant appears to have chiefly a southern distribution but may have a wider range than is supposed as it is likely to be passed over by collectors for *H. repanda*. It has not been reported as yet outside of the type locality where it is not common. The original description was made from dried specimens, which without ample field notes are always unsatisfactory in the case of fleshy fungi. The description is now corrected and supplemented by the excellent field notes since received from Professor Earle.

2. HYDNUM ALBIDUM Peck, Bull. N. Y. State Mus. Nat. Hist. **1**: 10. 1887

Plant terrestrial, mesopodous, white to cream-colored, staining brown when injured, 2–5 cm. high; pileus nearly plane or slightly convex or depressed, more or less irregular, margin thin; surface "subpruinose" from "felted fibrils," dry, 2–8 cm. wide; substance fleshy-fibrous, brittle, becoming mealy, white turning reddish or brownish when injured; stem slender, terete, even, enlarging to a subbulbous base, more or less excentric, widening into the pileus, solid, concolorous, 2–5 cm. long by 0.5–1 cm. wide; teeth white staining brownish, slender, terete, tapering, acute to "bristle tipped," subdecurrent, crowded, about 3 to one millimeter, 1.5–3 mm. long by 0.15–0.25 mm. wide, shorter toward stem and margin; spores white or hyaline, subglobose to subpyriform, smooth, 3.5–5.5 μ wide; taste mild at first, afterwards becoming slightly acrid.

HAB.: In mixed woods. Aug.–Nov.

RANGE: New York, *Peck*, *Peck & Earle 817*, *Underwood*, *Banker 713*; Connecticut, *Earle 1310*, *Underwood & Earle 1202*

ICON: Peck, Rept. N. Y. State Mus. Nat. Hist. **51**: *pl. 56. f. 1–7.*

The plant as thus far reported is northeastern in its distribution. The New York collections have all been east of the Hudson. The plant has also been reported from Vermont, *Burt*, but I have not seen his specimens.

Peck does not mention in his description that the flesh turns yellow or brown when bruised, but specimens found by the writer in New York and by Underwood and Earle in Connecticut while in all other respects answering to Peck's plants showed also this characteristic. I have usually found this plant in very wet ground.

3. HYDNUM REPANDUM L. Sp. Pl. **2**: 1178. 1753

Hydnum rufescens Schaeffer, Fung. Bav. et Pal. Icon. **4**: 95. *pl. 141.* 1774.

Hydnum flavidum Schaeffer, *op. cit.* **4**: 99. *pl. 318.* 1774.

Hypothele repanda Paulet Icon. Champ. **2**: 126. *pl. 35. f. 1, 2.* 1800?

Dentinum repandum S. F. Gray, Nat. Arr. Brit. Pl. **1**: 650. 1821.

Tyrodon repandus Karsten, Rev. Myc. 3^1: 19. 1881.

Hydnum umbilicatum Peck, Bull. N. Y. State Mus. **10**: 953. *pl. K. f. 14–18.* 1902.

Plant terrestrial, mesopodous, cream-colored to tawny or reddish, medium size to small, 1–9 cm. high, more or less gregarious pileus convex to depressed, occasionally subinfundibuliform, generally uneven, irregular, 1–12 cm. wide; margin repand, sometimes fluted, fertile; surface subpubescent to pruinose or nearly smooth, sometimes cracked towards the center into thick scales, pale buff to reddish buff, usually darker towards the center; substance fleshy, brittle, subfibrous becoming mealy, white; stem stout to slender, bulbous at base, subcylindrical, sometimes curved or inclined, somewhat excentric, surface smooth or subpruinose, usually paler than the pileus but sometimes darker, solid, 2.5–6 cm. long, 0.5–2.5 cm. thick; teeth coarse, straight, terete to flattened, acute or fimbriate tipped, scarcely decurrent as granules, 1–6 mm. long by 1 mm. wide, when flattened sometimes 4 mm. broad, white or cream colored; spores subglobose to subpyriform, usually apiculate, guttulate, 6–9 μ wide, white; taste at first mild, then slightly acrid.

HAB.: In mixed woods. July–Jan.

RANGE: Maine, *Harvey, White;* Massachusetts, *Underwood;* Connecticut, *Underwood 837, 813, etc., Earle 462;* New York, *Underwood, Zabriskie, Peck, E. C. Howe, Fischer, Banker;* New Jersey, *Ellis;* Pennsylvania, *Schweinitz;* Virginia, *Murrill;* West Virginia, *Nuttall;* Alabama, *Earle, Baker.* It has also been reported from North Carolina, *Schweinitz*; South Carolina, *Curtis;* Kentucky and Ohio, *Morgan;* and California, *Harkness & Moore.*

ICON.: Atkinson, Mushrooms Edible Poisonous, etc., 2d Ed. *pl. 78;* Barla, L'Champ. de l'Prov. de Nice *pl. 39. f. 1–9;* Bulliard, Herbier de la France *pl. 172;* Cordier, Les Champ. *pl. 43;* Fries, Sverig. ätl. svamp. *pl. 15;* Gibson, Edible Toadstools and Mushrooms, *pl. 27;* Hussey, Ill. Brit. Myc. **1**: *pl. 16;* Kromb-

holz, *pl. 50. f. 1–9;* Peck, Rept. N. Y. State Mus. **48**: *pl. 38;* Rept. Conn. Board Agric. **29**: *pl. 6, f. 2;* Sowerby, Eng. Fung. *pl. 176.*

Besides its unusual cosmopolitan range this species appears to possess extreme variability. Several attempts have been made to split it up into distinct species but without very great success. The following key may assist in some degree in separating the principal forms peculiar to this country and is offered as an aid to a better knowledge of this difficult aggregation.

Plants reddish buff
- Plants small, averaging less than 4 cm. wide, often umbilicate, spores large, 8–10 μ wide. Form A.
- Plants large, stout, reaching 12 cm. wide, average width of cap 6–8 cm.; pileus often cracked, sometimes into thick scales, deeply umbilicate, spores 7–8 μ wide. Form B.

Plants pale buff to cream-colored, slender, medium size, averaging 4–6 cm. wide, rarely 8 cm., spores 7–8 μ wide. Form C.

Form A is presumably *Hydnum umbilicatum* Peck, *loc. cit.* In all of the above forms none of the characters ascribed appear to be constant, while intermediate forms are readily found that connect them most intimately. Whether these forms can be regarded as true species or even as varieties can only be decided by a careful study of the living plants.* The extreme seasonal range of this species is due to its northern and southern distribution.

4. HYDNUM CAESPITOSUM Banning; Peck, Rept. N. Y. State Mus. **44**: 74. 1891

Plant terrestrial at base of trees and stumps, mesopodous, cespitose, yellowish, 6 cm. high; pileus convex to expanded or subplane, subregular, even, 4 cm. wide, subconfluent, margin even; surface appressed-fibrous, pale ochre, yellow, or dark flesh-colored; substance fleshy, white, turning yellow when cut; stem solid, subcylindrical, subflexuose, floccose above, subglabrous below, whitish, staining yellow when bruised, 6 cm. long by 1 cm. wide, united at the base; teeth short, conical, acute, decurrent, pale ochre or light flesh color, less than 3 mm. long, 2 or 3 to one millimeter; spores subglobose, 7 μ wide; taste mild.

* A full discussion of the variability of this species will be found in Torreya **4**: 113.

HAB.: On ground at roots of trees and near old stumps. July.

RANGE: Maryland, *Banning;* Connecticut, *Earle.*

I have not seen the the type specimens which were found by Miss Banning in Maryland. Earle's Connecticut plants differ from Miss Banning's description only in their somewhat darker color.

5. HYDNUM WASHINGTONIANUM Ell. & Everh. Proc. Phila. Acad. 1894: 323. 1894

Plants terrestrial, mesopodous, pale orange, 4 cm. high; pileus subplane, slightly depressed, thin, irregular, 4 cm. wide; surface glabrous, wrinkled when dry, pale orange; substance fleshy, "subviscose"; stem subcylindrical, tapering slightly toward the base, solid, central or slightly excentric, 3 mm. wide; teeth terete, slender, acute, decurrent half way down the stem, pale yellow nearly white when fresh, 3–5 mm. long; spores subglobose, white, 6–7 μ wide, "borne on clavate to cylindrical basidia 20–22 by 6 μ, with four erect slender sporophores about 6 μ long."

HAB.: On the ground in coniferous woods. Dec.

RANGE: Washington, *Parker 214.*

Only the typé specimen has been seen and the above description is based largely on the original description by Ellis.

6. HYDNUM SUBLAMELLOSUM Bulliard, Hist. des Champ. de la France. 306. 1791

Sistotrema confluens Persoon, Disp. Meth. Fung. in Neues Mag. für die Bot. 1: 108. 1794.

Plants terrestrial, mesopodous, gregarious, more or less confluent, pale yellow, small, 1–2 cm. high; pileus depressed or subinfundibuliform, irregular, 0.5–2 cm. wide; margin thin, repand, sterile; surface apparently glabrous or viscid (?), pale yellowish-white to orange; substance fleshy, fibrous, thin, soft when dried; stem slender, terete, attenuate downward to a bulbous base, concolorous with pileus; teeth short, compressed or flattened, often confluent and deformed forming pseudopores, decurrent, pale yellow to ochraceous, less than 1 mm. long, 3 or 4 to one millimeter; spores hyaline or white, oval or oblong, smooth, 3 by 4 μ.

HAB.: On ground under conifers. Sept.–Jan.

Range : Alabama, *Earle*, *Baker;* Vermont, *Burt.*

Icon. : Bulliard, Herb. de la France, *pl. 453. f. 1.*

Exsicc. : Fautrey, Herb. Crypt. de la Cote-d'Or (France) 2282. *Rabenhorst*, Fung. Europ. 1409.

The above description was written from the dried specimens and without any field notes, and may, therefore, be inaccurate in some particulars. The plants grow among the needles of conifers which become imbedded in the pileus or adhere to the surface in a way that suggests its being probably viscid. The species has been generally known by Persoon's name. Many specimens that are referred to *Sistotrema confluens* Pers. prove to be flat toothed forms of *H. repandum* but the above collections are very distinct and answer in all particulars to Bulliard's plant. In his original description of *S. confluens* Persoon said "pileo suberoso" but in Syn. Fung. 551 he says "pileo carnoso." In other respects the descriptions are alike and the references are the same. It would seem, therefore, that the first expression was an error. Although the above collections are so widely removed from each other geographically there appears to be no question of their identity.

If we regard these plants as typical representatives of the genus *Sistotrema*, there appears to be no ground whatever for separating that genus from *Hydnum*. Karsten in the Revue Mycologique 3^1: 19. 1881, places the genus *Sistotrema* with *Merulius* and *Phlebia* in the tribe Merulieae which he first assigned to the Hydneae and afterward to the Polyporeae. While *Phlebia* appears to be more closely related to *Merulius* than to any of the genera of the Hydnaceae, I should place it in the family Thelephoraceae, but *Sistotrema confluens* Pers. seems to be congeneric with *Hydnum repandum* in every particular except the almost constant tendency of the hymenial surface to form pores. This character, however, is not uncommon among Hydnaceae and cannot be considered in itself as a sufficient ground for even generic distinction.* In fact the separation of the families Polyporaceae and Hydnaceae on the basis of the hymenial surface in the former case consisting of pores and in the latter of teeth must be made with considerable mental reservation.

* *Cf. Hydnellum zonatum*, *Hydnum sublamellosum* and *Steccherinum adustum.*

SPECIES INQUIRENDA

Hydnum diffractum Berk. Lond. Jour. Bot. 6: 323. 1847.

This species is said to be allied to *H. repandum*. The description is too incomplete to be satisfactory. The type material as seen by Underwood was "an amorphous mass of fungous matter with no indication of teeth whatever." I have never seen anything that appeared to answer to the description,* and am strongly inclined to believe that the species represents one of the large cracked specimens of *H. repandum*.

2. HERICIUM Pers. Neues Mag. für die Bot. 1: 109. 1794

Hericium Fries, Syst. Orb. Veg. 88. 1825, *pro parte*.
Medusina Chevallier, Fl. Gen. des Env. de Paris 278. 1826.
Friesites Karsten, Medd. Soc. Faun. et Fl. Fenn. 5: 27. 1879
Dryodon Quélet; Karsten, Rev. Myc. 3[1]: 19. 1881.

Plant body branched or tuberculiform or rarely wanting, sessile or short stipatate, epixylous, parasitic or saprophytic, white or yellowish; teeth pendent, short or long; spores subglobose to oblong, smooth, white, uniguttulate, the guttula central and usually occupying half to two-thirds of the spore.

The genus, which is not the same as *Hericium* Fries, was first established by Persoon, on *Hydnum coralloides* Scop. a single species. In 1797 Persoon again published the genus with several species in his *Commentatio de Fungis Clavaeformibus*. In 1821, Fries, Syst. Myc. 1: 408, placed the species in the third tribe of the genus *Hydnum* namely *Merisma*. He divided the group into two subtribes: *Genuina* which included *H. coralloides* and *H. clathroides*; and *Gomphi* which included *H. Caput-Medusae*, *H. hystrix* *H. echinus* and *H. ramaria*. Later in 1825, *op. cit.*, Fries raised the subtribe *Gomphi* to generic rank and gave it the name *Hericium* but expressly declared it was not to be confused with *Hericium* Pers. the type of which he asserted was *H. coralloides*. Why, therefore, Fries should have used *Hericium* as the name of his new genus at all can only be understood as revealing the loose nomenclatural methods then in use. Unfortunately the weight of Fries' influence gave a stability to his genus that its intrinsic value could not

* *Cf.* Bull. Torrey Club 28: 207 for further discussion and a copy of the original description of this species.

command and Persoon's earlier work was forgotten. Afterward Fries, Epic. 511, removed from his genus *H. caput-Medusae* and *H. ramaria* and remanded them back to their association with *H. coralloides* in the tribe *Merisma* of his genus *Hydnum*. Fries considered the possibility of regarding the group thus brought together as a distinct genus but abandoned it. In 1878 Quélet in the *Clavis Hymenomycetes* published by himself in association with Cooke, suggested treating the tribe *Merisma* of Fries as a group of generic rank and proposed the name *Dryodon* for it but failed to establish the genus according to modern criteria. The next year Karsten, not knowing of Quélet's suggestion, established the genus *Friesites* for substantially the same group.* But in 1881, having in the meantime seen the *Clavis Hymenomycetes* of Cooke and Quélet, he took up the name *Dryodon* suggested by Quélet and substituted it for his own *Friesites* thus giving the genus *Dryodon* a proper publication. By the latter name the group has generally been known when it has been recognized. At an earlier date, however, Chevallier, 1826, established the genus *Medusina* on two species, *M. patula* = *Hericium Erinaceus* (Bull.) and *H. coralloides* (Scop.). The law of priority requires that we should reinstate the older *Hericium* of Persoon.

Synopsis of Species

Pileus distinctly branched or tuberculiform, light-colored, whitish at least when young.
- Pileus more or less branched to the base.
  - Teeth covering the underside of all branches even to the base. 1. *H. laciniatum*.
  - Teeth chiefly on the ultimate branches, usually long and pendent. 2. *H. coralloides*.
- Plant more or less massive or tuberculous.
  - Plant tuberculous ; teeth pendent directly from the body. 4. *H. Erinaceus*.
  - Plant subtuberculous ; teeth pendent from short peripheral branches. 3. *H. caput-ursi*.

Pileus a resupinate subiculum of concrescent tubercles or wanting, ochraceous to buff.
- Plant of many coalescent tubercles with pendent teeth, yellow to orange.
  - Spores oval 3.6 by 5.5 μ, teeth compressed or terete, often branching. 5. *H. croceum*.
  - Spores oblong curved, 2.7 by 4.5 μ ; teeth flattened, fimbriate, simple. 6. *H. fimbriatum*.
- Plant consisting of a single fascicle of teeth with little or no subiculum, whitish. 7. *H. fasciculare*.

* It is unfortunate that this circumstance should thus render it impossible that the greatest of mycologists should have the one genus dedicated to his honor which tradition asserts was the inspiration to his life work.

1. **Hericium laciniatum** (Leers)

Hydnum laciniatum Leers, Fl. Herb. 2d. ed. 280. 1789.*

Hydnum ramosum Bulliard, Hist. de Champ. de la France, 305. *pl. 390.* 1791.

Hydnum abietinum Schrader, Spic. Fl. Germ. 181. 1794.

Medusina coralloides Chevellier, Fl. Gen. des Env. de Paris 1: 279. 1826, in part?

Plants gregarious, epixylous, branched from a single short or scarcely evident stipe, shining white throughout, becoming brownish with age, the whole mass 6–20 cm. wide; stipe usually imbedded in the substratum, 1–3 cm. wide, immediately on emerging branching copiously into variously curved and delicate branchlets which occasionally anastomose near the base, are sometimes short and divaricate, sometimes long and serpentine; the ultimate branchlets often only 1 mm. thick; substance fleshy, white; teeth chiefly dependent from lower surface of branches, more or less uniformly distributed on the branches quite to the base; at the ends of the branches the teeth are usually on all sides and more or less erect occasionally drooping or pendent in terminal clusters, terete, acute, 0.5–5 mm. long; spores globose to suboval, smooth, uniguttulate, white, 4–5 μ wide; odor somewhat unpleasant; taste slightly pungent.

HAB.: On beech and hickory logs. Aug.–Dec.

RANGE: Canada, *Dearness;* New York, *Shear, Peck;* Vermont, *Banker, Lee;* Pennsylvania, *Schweinitz, Banker;* New Jersey, *Geismar;* South Carolina, *Ravenel;* Ohio, *Sanders;* Indiana, *Underwood, Banker, Arthur, Ellis & Wright;* California, *Eastwood.*

ICON.: Boccone, Mus. di Piante Rare, *pl. 303. f. 7.* 1697; Micheli, Nov. Plant. Gen. *pl. 64. f. 2.* 1729; Sowerby, Eng. Fung. *pl. 252;* Bulliard, Herb. de la France, *pl. 390;* Peck, Rept. N. Y. State Mus. 48: *pl. 24. f. 11–13;* Atkinson, Mushr. etc., ed. 1900, *f. 184* †; *Idem*, ed. 1901, *f. 195* †; McIlvaine, One Thous. Am. Fung. *pl. 134.*

EXSICC.: Ravenel, Fung. Cat. Exsicc. 24; Shear, N. Y. Fung. 45; Ellis and Everhart, N. A. Fung. 1708, 1908; Roumeguère, Fung. Gall. 3703; Sydow, Myc. March. 1016; Kellerman, Ohio Fung. 126.

* The first edition of this work was published in 1775; whether it contained the above species is not known to the writer but it seems probable that it did.

† The figures in the two editions are identical and typical figures of this species.

The plant seems to be most commonly a saprophyte on beech logs but I have recently found it growing on hickory. It has usually been referred by mycologists to *H. coralloides* Scop. Boccone, however, as early as 1697 figured the two forms as distinct. They are undoubtedly closely related, and intermediate forms are to be found difficult of assignment exclusively to either category, but this may also be said of *H. coralloides* and *H. caput-ursi*, or of *H. caput-ursi* and *H. Erinaceus*. In fact all the species of this group are so closely related and so highly variable in themselves as to lead to much confusion.

There appear to be at least two distinct forms of this species. In the one the branches divide freely into a multitude of fine terminal branchlets which are often upturned and more or less erect at the ends. The teeth become shorter toward the ends of the branchlets and frequently stand out in various directions like thorns, but the majority are somewhat pendent. McIlvaine's figure is an excellent one of this form and shows clearly the peculiar character of the tips of the branches. Atkinson's figures are evidently also of this type. The other form has the branches usually longer and more slender, branching less freely, frequently curved or serpentine, the ultimate branchlets curving downward, the teeth frequently longer toward the tip of the branch and always pendent. This is undoubtedly the plant figured by Bulliard as *H. ramosum*. I cannot, however, regard these two forms as distinct species as I have found them both growing from the same log and apparently from the same mycelium.

2. Hericium coralloides (Scop.) Pers. Com. Fung. Clav. 155. 1797

Hydnum coralloides Scopoli, Fl. Carn. **2**: 472. 1772.
Hydnum crispum Scopoli, Fl. Carn. **2**: 473. 1772.
Medusina coralloides Chevallier, Fl. Gen. des Env. de Paris **1**: 279. 1826, in part?
Dryodon coralloides Karsten, Rev. Myc. 3^1: 19. 1881.
Friesites coralloides Karsten, Medd. Soc. Faun. et Fl. Fenn. **5**: 27. 1879.

Plant white throughout, branched from a single stipe-like base; branches stout, consisting of nearly sterile primary branches 2–6

cm. long, 1–1.5 cm. thick, and fertile secondary branches 0.5–1.5 cm. long, 2–5 mm. thick, often appearing as mere protuberances on the primary branches; substance fleshy, brittle to somewhat tough; teeth slender, terete, pendent chiefly from the secondary branches forming terminal drooping clusters, occasionally fasciculate on the primary branches, 3–10 mm. long; spores globose or subovoid, white, uniguttulate, 5.5–7 μ wide; taste mild but somewhat disagreeable.

HAB.: On beech and hickory logs. Aug.–Dec.

RANGE: Vermont, *Banker;* Massachusetts, *Farlow;* New York, *Cook, Banker;* Indiana, *Underwood, Banker.*

ICON.: Boccone, Mus. di Piante Rare, *pl. 304. f. 2.* 1697; Schaeffer, Fung. Bav. et Pal. Icon. *pl. 142;* Fries, Sverig. ätl. Svamp. *pl. 34;* Atkinson, Mushrooms, etc., ed. 1900, *pl. 67. f. 185; Idem.*, ed. 1901, *pl. 77. f. 196;* * Gibson, Edible Toadst. and Mushr. *pl. 28, 29.*†

EXSICC.: Desmazieres, Pl. Crypt. de France, 2160; Krieger, Fung. Sax., 1158; De Thümen, Fung. Aust., 622.

Specimens of this species are often referred to *H. caput-ursi*, which the plants greatly resemble. But in the latter species the ultimate branches spring from a massive tubercle, while in *H. coralloides* the whole plant is branched as in *H. laciniatum.* From the latter species *H coralloides* is distinguished by its larger spores and its relatively coarser branching, and especially in possessing two orders of branches, the primary without teeth except as borne in fascicles, generally on slight protuberances as if abortive branches, and the secondary, short usually straight branches bearing straight pendent teeth clustered chiefly toward the ends. The last feature frequently gives to the plant an appearance much like *H. caput-ursi* and doubtless has led to confusing the two species. The teeth are usually longer than in *H. laciniatum*, but this feature, as in all the species of this genus, is too variable to be of special value in specific diagnoses.

That the plants here described as *H. coralloides* Scop. are true

* These figures are given for *H. caput-ursi*, but in that species the branches are short and spring from a central tubercle, giving a more massive effect. In other respects the two species are very similar. The figure in the second edition is much superior to that in the first.

† The plates are marked *H. caput-Medusae*, but that species is not branched. *Cf. H. Erinaceus.*

representatives of Scopoli's original species and are not to be confounded with *H. caput-ursi* Fr. and that the plants here described as *H. laciniatum* Leers. are not *H. coralloides* Scop. will be evident from the following considerations: (1) Scopoli in his original description * said, "extremis ramulis teretibus, subulatis recte deorsum descendentibus." This conveys distinctly the idea that the pendent teeth are at the ends of the branches. (2) Again in a later work † he says, "Duas icones possideo, quarum una est stipes albus, horizontalis, fere semipedalis, digitum crassus divisus in ramos teretes, subadscendentes, ramossimos; *ultimis ramis modice deflexis et emittentibus aculeos concolores*, duas et tres lineas longos. Altera figura est cespes subovatus, pariter albus, crebris ramis instructus, quorum apices aculeis etiam semiuncialibus, perpendicularibus et fasciculatis terminati sunt." (Italics ours.) This likewise conveys the impression that the teeth are chiefly at the ends of the branches. The latter part of the account also contains a brief description of what became later *H. caput-ursi* Fries and it is evident that Scopoli associated the two forms as one species, differing chiefly in the character of the body and length of the teeth. In 1863 Fries separated the latter form as *H. caput-ursi* and remarked in his description that the periphery of the tubercle was broken up into little branches "ultimis *H. corallo-idis* haud absimiles." Moreover, in his figures of the two plants he clearly represents in *H. coralloides* Scop. a plant whose ultimate branches and the arrangement of the teeth are essentially the same as his figure of *H. caput-ursi.*

The plants here discussed are among the most beautiful of the fungi. Their snowy masses of intricate branches standing up from some old log appear like the most delicate frost work. Their beauty naturally attracted the earliest mycologists and led to their being noted among the early records of fungi. The first authentic record we have is that of Steerbeck in 1675.‡ He cites Clusius 1601 but the plant figured by Clusius appears more probably some species of *Clavaria.*

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* Flor. Carn. 61. 1760.

† Flor. Carn. 2 : 473. 1772. It was in this work that the name was published.

‡ Theatr. Fung. aft. het. Toon. der Camp. *pl. 27. f. G.* 1675.

3. Hericium caput-ursi (Fries)

Hydnum caput-ursi Fries, Monog. Hym. Suec. **2**: 278. 1863.
Friesites caput-ursi Karsten, Medd. Soc. Faun. et Fl. Fenn. **5**: 27. 1879.
Hydnum caput-ursi brevispineum Peck, Bull. N. Y. State Mus. Nat. Hist. **5**: 656. 1899.

Plant large, tuberculous, the tubercle narrowed behind into a comparatively small point of attachment about 1 cm. wide, subpyriform, compressed vertically or sometimes laterally, the outer portion of the tubercle broken up into numerous short stout deformed branches 0.5–2 cm. long by 0.5–3 cm. wide, which are again branched into smaller short branches that terminate in pendent teeth, the whole mass being 8–15 cm. long, 10–16 cm. wide, 6–12 cm. thick; * in a front view the mass appears more or less heart-shaped, color white to ochraceous, and in drying brownish to fuscous on the lower teeth; substance fleshy fibrous, somewhat tough; teeth slender terete, tapering, acute, subflexuose, pendent, shorter toward the top, 0.5–2 cm. long, about 1 mm. wide; spores globose to subovoid, numerous, white or hyaline, uniguttulate, 5.5–7 μ wide.

HAB.: On beech.

RANGE: Canada, *Macoun;* Vermont, *Burt;* New York, *Underwood, Cook, Peck, Southwick, Burlingham;* New Jersey, *Porter;* Indiana, *Underwood.*

ICON.: Fries, Icon. Select. Hym. *pl. 7;* Peck, Mem. N. Y. State Mus. Nat. Hist. **3**: *pl. 67. f. 8–12;* Peck, Rept. N. Y. State Mus. **51**: *pl. 56. f. 8–12.*

The plant seems to have been described by Scopoli in Flora Carniolica **2**: 473. 1772, but was referred to *H. coralloides.* Not until 1863 did it receive recognition as a distinct species. It is intermediate between *H. coralloides* and *H. Erinaceus,* being distinguished from the former by its tuberculous body and from the latter by the short branches from which the teeth are pendent. The tuberculous body is not always pendent as shown by Fries, but is sometimes horizontal and even ascending as shown by Peck. The plant varies also in the relative size of tubercle and branches and in the length of the teeth, apparently due to some local disturbances in the nutrition of the plant. Abnormally short teeth

* By length is meant in direction of growth; width is horizontal and at right angles to the first; and thickness is the vertical dimension.

are occasionally met with in other species of this genus but do not seem to warrant varietal distinction. The Macoun and Burlingham specimens are of this type.

4. Hericium Erinaceus (Bull.) Pers. Com. Fung. Clav. 159. 1797

Hydnum Erinaceus Bulliard, Hist. de Champ. de la France, 304. *pl. 34.* 1791.

Manina cordiformis Scopoli, Pl. Subterran. *pl. 10.*

Medusina patula Chevallier, Fl. Gen. des Env. de Paris, 1 : 279. 1826.

Dryodon Erinaceus Quélet, Ench. Fung. 192. 1886.

Plant body a more or less tuberculous mass narrowed behind to a comparatively small point of attachment, projecting usually horizontally from the substratum and terminating outwardly in long pendent teeth, in front view usually more or less heart-shaped, shining white throughout, becoming ochraceous to reddish-brown in drying; body of the tubercle subglobose to subpyriform, or compressed vertically, 5–10 cm. long, 3–12 cm. wide, 2–4 cm. thick, usually pendent, sometimes ascendant, solid, or more or less porous, or sometimes a mass of closely anastomosing branches, the upper surface more or less fibrillose ; substance fleshy-fibrous, hygrophanous or dry ; teeth long, slender, terete, tapering, acute, subflexuose to straight, dependent from the front of the tubercle, usually 2–3 cm. long by 1–2 mm. wide, at the top the teeth usually merge insensibly into the fibrils of the upper surface ; spores globose to subovoid, uniguttulate, white, smooth, 4.5–5 by 5–6 μ.

Hab. : On living oak, locust or beech, also occasionally on dead trees. May–Nov.

Range : New York, *Southwick*, *Clinton ;* New Jersey, *Ellis*, *Murrill ;* Pennsylvania, *Rau*, *Banker ;* Delaware, *Commons ;* Maryland, *Curtis ;* Virginia, *Griffiths*, *Murrill ;* Georgia, *Harper ;* Florida, *Martin ;* Alabama, *Skehan ;* Ohio, *Lloyd*, *Ricksecker*, *Quiroga ;* Indiana, *Brown*, *Underwood*, *Arthur ;* Michigan, *Langdon ;* Wisconsin, *Calkins ;* Missouri, *Demetrio ;* Kansas, *Cragin ;* Louisiana, *Langlois ;* Mexico, *Smith.*

Icon. : Boccone, Mus. di Piante Rare, *pl. 307.** 1697. Bulliard, *loc. cit. ;* Krombholz, *pl. 51. f. 1–3 ;* Cordier, Les Champ.

* The two upper left-hand figures, not numbered.

pl. 44. f. 2; Gillet, *pl. 318* *; Roze et Richon, Atlas des Champ. *pl. 64. f. 1–5;* Vittadini, Desc. dei Fungh. Mang. *pl. 26. f. 1–3.*

EXICC.: Roumeguère, Fung. Select. 5602; Rabenhorst-Wint. Fung. Europ. 3641 †; Kellerman, Ohio Fung. 127.

If any species of this genus can be said to be more variable than any other that distinction belongs to *H. Erinaceus.* Yet it appears to be impossible to group the variations into species without making almost as many species as one finds specimens. The typical form of this plant is as described above. From this type form the plant varies extremely in almost every feature. The whole mass may be globose with a scarcely evident point of attachment or it may be strongly vertically compressed and broadened until the plant appears almost ungulate or dimidiate; it may be narrowed behind into a comparatively slender stipe, or it may be sessile; it may be horizontal, pendent, or with the upper portion of the tubercle ascendant; the tubercle may be lobed suggesting an approach to *H. caput-ursi,* or at the base of the teeth it may be irregularly perforate and obscurely branched, it may be perforate throughout, or finally may consist of a mass of anastomosing branches; the teeth may be long or short,‡ straight, curved, or flexuose, terete or flattened; the flesh may be soft, tough, or, at least when dried, flaky and brittle; the upper surface may be sparsely fibrillose, or it may be covered densely with long flexuose spore-bearing fibrils, or with short erect stiff processes, also spore-bearing. Forms characterized by the last named feature have usually been referred to *H. Caput-Medusae.* But the feature thus emphasized as a specific character appears to be only a more vigorous development of the normally sparse fibrils of the typical *H. Erinaceus,* even in the matter of bearing spores. Moreover, even these forms do not strictly correspond to the description and figure of *H. Caput-Medusae* Bull. The last named species does not appear to have been found in this country.

H. Erinaceus is found most commonly emerging from wounds in living oaks, often from holes made by woodpeckers; occasion-

* Numbered according to the "Liste" of the Author.

† The specimen, however, is from Perryville, Missouri.

‡ I have seen specimens in which the longest tooth was not over 5 mm. long and others in which the longest tooth was fully 30 mm. in length.

ally it is found on locusts or on beeches; sometimes it is found on dead logs. Of fifteen specimens whose habitat was given, ten were on injured living trees; of these seven were *Quercus*, two *Robinia*, and one *Fagus;* the remaining five plants grew on dead logs, one on *Quercus*, one on *Hicoria*, and the others unknown. There appeared to be no positive evidence that the character of the fungus was effected either by the species of the host, or by the condition of the substratum as to vitality. But this point can not be fully determined without more data and more careful observations as to the condition of the host. There would seem to be some significance in the fact that *H. Erinaceus* appears to prefer living oaks while *H. laciniatum* and *H. coralloides* equally prefer dead beech.

5. **Hericium croceum** (Schw.)

Sistotrema croceum Schweinitz, Syn. Fung. Car. Sup. 76. 1818.
Hydnum croceum Schweinitz, Syn. N. Am. Fung. 163. 1834.
Hydnum Schiedermayeri Heuf. Oesterr. Bot. Zeitschrift **20**: 33. 1870.

Plant body a resupinate subiculum, effused 7 cm.–1 m. long by 2–15 cm. wide, irregularly thickened into tuberculous protuberances 2–10 mm. thick, 0.5–2 cm. wide, from which the teeth depend, cream-colored to reddish buff towards the ends of the teeth, becoming darker in drying; subiculum pubescent to tomentose; margin determinate, fimbriate; teeth fasciculate, pendant from the tubercles, bulbous and pubescent at base, glabrous, subtranslucent toward the point, terete; the acute to flattened fimbriate apex, sometimes forked, 4–5 mm. long; spores white, ovoid, uniguttulate, 3.6 by 5.5 μ; substance fibrous, somewhat tough.

Hab.: On living or dead apple tree. Aug.

Range: New York, *Banker;* New Jersey, *Griffiths;* Pennsylvania, *Rau.*

Icon.: Kalchbrenner, Icon. Select. Hym. Hung. *pl. 38. f. 4.*

Exsicc.: Ellis, N. Am. Fung. 930.

The Ellis plants in North American Fungi were referred to *H. Schiedermayeri.* A similar plant was found by the writer on the vertical side of a crevice in a living but diseased apple tree. This plant was almost a counterpart of Kalchbrenner's figure. In the same orchard was found another specimen effused for 20–25 cm. on the under side of dead apple-tree limbs. This plant was evi-

dently identical with the former in all essential features, but from its mode of growth the teeth were in general vertical to the substratum instead of appressed or parallel to it. It appears to present all the characters of *H. croceum* Schw. Schweinitz does not mention the habitat of his species further than that it was on dead wood. *H. Schiedermayeri* Heuf. has never been reported except on apple-tree wood, and Heufler expressly states that it is found only on apple trees. *H. croceum* Schw. appears to be the plant when growing on a horizontal substratum and *H. Schiedermayeri* Heuf. the same plant growing on a vertical substratum. Schweinitz adds that "it spreads on wood more rarely to a remarkable length and breadth." A specimen found by David Griffiths on an apple-tree log at Fort Lee, New Jersey, and now in the museum of the New York Botanical Garden, measures a meter long by 15 cm. wide. It is of remarkably vigorous growth, and the tomentose character of the subiculum has extended in some degree to the teeth.

The plant at first sight appears to have little in common with the preceding species of this genus. But the tuberculous thickenings of the subiculum from which the teeth chiefly depend, and the white ovoid smooth uniguttulate spores seem to indicate its proper association in the genus *Hericium*. The type specimen of Schweinitz is destroyed. *H. croceum* Schw. has also been reported from West Virginia, *Nuttall*, and Maine, *Harvey*, but I have not seen these specimens.

6. **Hericium fimbriatum** sp. nov.

Plant a resupinate subiculum, irregularly effused 5–7 cm. on a vertical substratum, fleshy, obscurely tuberculate, 1–15 mm. thick, whitish to reddish on the more exposed parts, in drying becomes dull ochraceous or isabelline with whitish margin; margin generally indeterminate but at the lower edge determinate, spreading, fan-shaped, fimbriate; subiculum consisting of more or less clearly distinguished branches anastomosing and forming thickened tubercles; on the upper part of the plant these branches end in free fimbriate points about 1 mm. long; teeth pendent on the lower part of the plant and from the underside of the tubercles, terete to flattened, with whitish fimbriate tips, 3–10 mm. long, 0.2–1.5 mm. wide; spores oblong, slightly curved, uniguttulate, 2–2.5 by 4–4.5 μ, apparently white or hyaline.

Hab.: On a decaying stump of some hard wood, between the bark and wood. Oct.

Range: Pennsylvania, *Banker.*

The plant closely resembles specimens of *H. croceum* Schw. but differs in the whitish margin, the more flattened, and whitish fimbriate tips of many of the teeth, and particularly in the size and form of the spores.

7. **Hericium fasciculare** (Alb. & Schw.)

Hydnum fasciculare Albertini & Schweinitz, Consp. Fung. 269. *pl. 10. f. 9.* 1805.

Plant with little or no subiculum, whitish becoming reddish in drying; teeth fasciculate, pendent, often united at base and more or less confluent in groups of three or four; fascicles consisting of 4–12 teeth; teeth terete, slender, tapering, acute, 0.5–1.5 cm. long, center of tooth darker than surface.

Hab.: On decayed pine and fir trunks.

Range: Pennsylvania, *Schweinitz.*

Schweinitz in his description says "albidus pallens, sed ne tantillum quidem rufescens." But the specimen in the Philadelphia Academy of Sciences shows in its dried state a reddish color. The plant has also been reported from South Carolina, *Ravenel;* Alabama, *Peters;* North Carolina, *Curtis.* These I have not seen.

Species inquirendae vel excludendae

Hydnum ramaria Fr. has been reported from California *Harkness*, but I have seen no specimens.

Hydnum ramosum Schw. was described originally by Schweinitz in Syn. Fung. Car. Sup. 78. 1818. In his later work, Syn. N. Am. Fung. 162, he remarks, "Also observed at Bethlehem, but does not vary much from the former" (*i. e.*, *H. coralloides*). No specimen has been preserved in the Schweinitz herbarium, the plant has never been reported by any one else, and finally the name itself is preoccupied by *H. ramosum* Bull. The species may, therefore, be wholly discarded.

3. STECCHERINUM S. F. Gray, Nat. Arr. Brit. Pl. 1: 651. 1821

Creolophus Karsten, Medd. Soc. Faun. et Fl. Fenn. 5: 28. 1879.
Gloiodon Karsten, *op. cit.* 5: 28. 1879.

Climacodon Karsten, Rev. Myc. 3[1]: 20. 1881.
Sclerodon Karsten, Finlands Basidsv. 360. 1889.

Plants epixylous, sessile, or stipitate, more or less dimidiate effused reflexed, or rarely wholly resupinate; substance usually fibrous, tough, or sometimes subfleshy; teeth terete or flattened; spores smooth, ovoid to oblong, white or hyaline, minute.

Gray established the genus on *Hydnum Daviesii* Sow. = *H. ochraceum* Pers. But his work receiving little or no recognition, the genus was never taken up. In 1879 Karsten established the genera *Creolophus* on *H. corrugatum* Fr. and *Gloiodon* on *H. strigosum* Swartz. Later he established the monotypic genus *Sclerodon* on *H. strigosum* Swartz, making it thus a synonym of his own *Gloiodon* and actually quoting the latter as a synonym. There seems to be no reason whatever for this change of name. Karsten's efforts thus to segregate these plants into distinct genera appear to have been rather unsatisfactory and although the genus as here treated includes some rather widely varying forms it does not seem to be possible to separate them on any lines of natural cleavage, while the spore characters appear to indicate a high degree of uniformity.

Synopsis of the Species

Plants usually sessile or resupinate (substipitate in no. 2), spores more than 2 μ wide and 3 μ long.
- Substance of plant dry, fibrous, tough, when fresh; pileus less than 8 cm. wide.
  - Plants densely gregarious, more or less confluent, whitish, grayish, or ochraceous.
    - Pileus dimidiate, sessile, decurrent on the substratum or resupinate, scarcely pubescent. 1. *S. ochraceum.*
    - Pileus more or less flabelliform, narrowed behind, substipitate, rarely resupinate, usually strigose hairy. 2. *S. Rhois.*
  - Plants not confluent.
    - Surface of pileus pubescent or smooth.
      - Pileus mostly drab, 3 cm. or more wide. 3. *S. Morgani.*
      - Pileus isabelline to umber, usually less than 3 cm. wide. 4. *S. reniforme.*
    - Surface of pileus densely strigose. 5. *S. strigosum.*
- Substance of plant juicy or at least moist when fresh.
  - Surface of pileus smooth or scabrous; plant small, less than 6 cm. wide. 7. *S. agaricoides.*
  - Surface of pileus pubescent or tomentose; plants usually large, more than 10 cm. wide.
    - Substance of plant gummy, subflexible when dry. 6. *S. pulcherrimum.*

Substance of plant not gummy, compact, somewhat dry, more or less brittle when dry. 8. *S. septentrionale.*

Plants more or less stipitate (sometimes sessile or resupinate in no. 10); substance dry, fibrous.

Pileus branched, flabellate; teeth radially compressed, less than 1 mm. long; spores more than 3.5 μ wide. 11. *S. plumarium.*

Pileus scarcely flabellate; teeth subterete; spores less than 3 μ wide.

Plant large, complicated; teeth straight, becoming dark, white to light or dark umber, sometimes bluish. 9. *S. adustum.*

Plant small, simple; teeth flexuose, white to ochraceous, not turning dark. 10. *S. adustulum.*

1. STECCHERINUM OCHRACEUM (Pers.) S. F. Gray, Nat. Arr. Brit. Pl. 1: 651. 1821

Hydnum ochraceum Persoon; Gmelin, L. Syst. Nat. 2: 1440. 1791.

Hydnum Daviesii Sowerby, Eng. Fung. 15. 1797.

Hydnum plumarium B. & C., Grevillea 1: 97. 1873. Not B. & C. Jour. Linn. Soc. 10: 324. 1869.

Climacodon ochraceus Karsten, Ryssl. Finl. och den Skand. Half. Hattsv. 2: 98. 1882.

Leptodon ochraceum Quélet, Ench. Fung. 192. 1886.

Hydnum conchiforme Saccardo, Syll. Fung. 6: 458. 1888.

Plant sessile, pileate, effuso-reflexed or rarely wholly resupinate; pilei more or less imbricate, often confluent, sessile, subdimidiate, depending, decurrent behind along the substratum, often spreading effused, usually appearing more or less campanulate, 0.2–4 cm. wide, 0.2–1.5 cm. long; surface sulcate-zonate, subrugose, subtomentose, ochraceous to cinereous or gray; margin incurved or reflexed, entire, pubescent, sterile for 1 mm. or more; substance tough, fibrous, thin, 1 mm. or less thick, whitish, dry; hymenium ochraceous, whitish-pubescent; teeth slender, short, compressed to subterete, often forked, acute, tough, shorter toward margin, 1.5 mm. or less long, 0.25 mm. wide, crowded 3 and 4 to one millimeter; spores minute, ovoid, smooth, granular, hyaline, 3 by 3.5 μ; tasteless, odorless.

HAB.: On dead *Carpinus*, *Thuja*, *Viburnum*, *Fagus*, *Acer*. Throughout the year.

RANGE: Canada, *Dearness*, *Macoun*; New York, *Shear*; New Jersey, *Ellis*; Pennsylvania, *Banker*, *Jackson*; Alabama, *Earle*; Ohio, *Morgan*; Iowa, *Holway*; Texas, *Billings*.

ICON.: Persoon, Syn. Meth. Fung. *pl. 5. f. 5*; Sowerby, Eng. Fung. *pl. 15*.

EXSICC.: Shear, New York Fung. 114.

The collections indicate that the species varies greatly in form and habit. It also undergoes considerable change in appearance during growth. *Hydnum conchiforme* appears to me to be a young state of the plant.

2. **Steccherinum Rhois** (Schw.)

Hydnum Rhois Schweinitz, Syn. Fung. Car. Sup. 77. 1818.
Hydnum flabelliforme Berkeley, Lond. Jour. Bot. 4: 306. 1845.

Plant pileate, short stipitate, subsessile, or effused to resupinate, subimbricate, laterally confluent; pileus flabelliform to subdimidiate, horizontal or ascending, narrowing behind, 1.5–2.5 cm. wide, 1–3 cm. long, surface sulcate-zonate, often radiately rugose, strigose-hairy to subtomentose, the strigose character more marked toward the margin, light gray on older and more exposed pilei, light buff on younger and more protected parts; margin entire, repand, subfertile or sterile less than 0.5 mm. incurved or reflexed, puberulent; substance fibrous, tough, dry, thin; stem lateral, short, vertically compressed, less than 5 mm. long or wanting and plant spreading back resupinately over the substratum; hymenium ochraceous, whitish-pubescent, often delimited behind; teeth crowded short, more or less decurrent, ochraceous to buff, compressed, often forked, whitish-puberulent, 1–2 mm. long, 3 and 4 to one millimeter; spores elliptical or oblong, smooth, granular, hyaline, 2–2.5 by 3–3.5 μ; tasteless, odorless.

HAB.: On dead *Liquidambar*, *Nyssa*, *Rhus*, *Mohrodendron*, *Quercus*. Throughout the year.

RANGE: Pennsylvania, *Banker;* Maryland, *Ricker;* New Jersey, *Ellis;* South Carolina, *Ravenel;* Alabama, *Earle;* Florida, *Rolfs;* Ohio, *Morgan;* Indiana, *Underwood;* Texas, *Billings*, *Hodson*.

EXSICC.: Ravenel, Fung. Am. Exsicc. 455 (as *Hydnum ochraceum*); Ellis, N. Am. Fung. 605, as (*Hydnum ochraceum*); Ravenel, Fung. Car. Exsicc. 25.

The type specimen in the Schweinitz herbarium is entirely destroyed. I have not found it possible to separate *H. flabelliforme* from the above species. Berkeley himself expressed doubt as to their being distinct. This species like *S. ochraceum* is extremely variable but with abundance of material one finds that these various forms blend inextricably with each other. There is some reason to

doubt whether *S. ochraceum* and the present species can be maintained as specifically distinct. Young and resupinate forms of the two species are practically indistinguishable, and the fragments commonly sent in by collectors for identification will frequently puzzle the expert to decide to which species they should be referred; while many forms are found so unlike either as to render it impossible to assign them to one rather than the other. The latter might be regarded as distinct species if there were any evidence that their distinguishing characters were constant. Nevertheless, in mature well developed plants, the contrast in the character of the pilei is very marked and seems to warrant the recognition of at least two distinct but closely related species.

3. **Steccherinum Morgani** sp. nov.

Plant pileate, sessile, gregarious, subimbricate, distinct; pileus dimidiate to subflabelliform, horizontal, thin, about two millimeters thinning out to the margin, thickened at point of attachment to 5 mm., 3.5–6 cm. wide, 3.5–4 cm. long; surface subradiately tomentose or pubescent, uneven toward center, sulcate-zonate toward margin, drab to pale buff; margin smooth, uneven, straight, thin, acute, substerile; substance fibrous, tough, subflexible when dry, light buff; teeth short, straight, compressed, forked or fimbriate, umber to tawny in side view but the hymenium between the teeth is light buff, 1 mm. long shortening to the margin, 0.17–0.20 mm. wide, 3 and 4 to one millimeter.

Ohio, *Morgan.*

The above description is drawn up from dry material from Mr. A. P. Morgan. Morgan referred the plant to *Hydnum glabrescens* B. & R. but comparison with the type of that species convinces me that they are not the same.

4. **Steccherinum reniforme** (B. & C.)

Hydnum reniforme B. & C. Jour. Linn. Soc. **10**: 325. 1869.
Hydnum glabrescens Berk. & Rav. Grevillea **1**: 97. 1873.

Plants pileate, subsessile, gregarious but not confluent; pileus reniform to orbicular, sometimes subcuneiform, horizontal, subpendent, 3 mm. to 3 cm. wide, 2 cm. long, less than 1 mm. thick; surface even, sulcate zonate, subpubescent, color chiefly light umber or isabelline, sometimes alternating toward the margin with cream-colored zones; margin cream-colored, thin, even, entire

obtuse, sterile; substance tough, subflexible; stem scarcely evident, 4–8 mm. wide, lateral or superior; hymenium often zonate, concolorous with surface; teeth short, terete or compressed, often forking, umber, the longest subtranslucent, opaque toward margin, minutely pubescent, 1 mm. long near the base of pileus shortening to the sterile margin, 3 and 4 to one millimeter; spores not observed.

Honduras, *Wilson.*

The type specimens were from Cuba. The plant has also been reported from Alabama, *Atkinson.* I have not seen the latter. The Honduras specimens differ from the type in a firmer substance to the pileus, and more distinct color zonation. In the type the teeth are distinctly pubescent. The above description was made from dried, pressed material.

Hydnum glabrescens Berk. & Rav., was described from material from South Carolina, *Ravenel* no. 1634, and Ceylon, *Thwaites* no. 385. The latter specimen is now a poor scrap which appears to have been from a resupinate plant. Such characters as can be made out do not seem to indicate the same thing as the Ravenel specimen, as might be expected from its distribution. Ravenel no. 1634 does not appear to be essentially distinct from the type of *Hydnum reniforme.* It is a slightly larger plant, but has the same color, substance, and sulcate-zonate features. In form it is irregularly dimidiate, and the teeth do not appear to be pubescent but they are in such poor condition that this character is not certain. No spores were found on either plant. At Kew a variety of things is placed with this species. The glabrate character which gives the specific name to the species is not so marked in the type specimen as it is in the type specimen of *Hydnum reniforme.* On the whole it appears doubtful from a comparison both of the descriptions and of the type specimens whether *Hydnum reniforme* B. & C. and *H. glabrescens* B. & R. are really distinct species.

5. Steccherinum strigosum (Swartz)

Hydnum parasiticum Persoon, Icon. et Descrip. Fung. 55. 1800. Not *H. parasiticum* L.

Hydnum strigosum Swartz, Kongl. Vetensk. Acad. Nya Handl. 1810: 250.

Gloiodon strigosus Karsten, Medd. Soc. Faun. et Fl. Fenn. 5: 28. 1879.

Sclerodon strigosus Karsten, Finl. Basidsv. 361. 1889.

Plant pileate, sessile, solitary or imbricate; pileus dimidiate, subconvex, or when imbricated deformed; surface scabrous with strigose branched hairs, fuscous, becoming blackish; margin lobed; substance dry, fibrous, fuscous; teeth terete, long, flexuose, forked near the margin, at first whitish variegated, becoming glaucous-cinereous.

RANGE: Pennsylvania, *Schweinitz.*

ICON.: Persoon, *op. cit. pl. 14. f. 1.*

The species appears to be rare. It has been reported from New York, *Peck*, and from Massachusetts, *Frost.* I have seen only the Schweinitz specimen. This is peculiar and unlike any thing else I have seen. The plant throughout is very dark brown to blackish, the pileus excavated within into sponge-like cavities, the surface covered with a dense coating of slender dark hairs; teeth long, flattened and confluent so as to form tubes, the hymenial surface appears much like *Fistulina.* The specimen is only a fragment and old. The description given above is adapted largely from Swartz. Persoon received a specimen of the plant from Swartz which he figured and described as *Hydnum parasiticum* L. But afterward Swartz pointed out that it was not the species of Linnaeus. Persoon, however, retained the name, having transferred *Hydnum parasiticum* L. to another genus. Finally Swartz published the plant as *Hydnum strigosum.*

6. **Steccherinum pulcherrimum** (Berk. & Curt.)

Hydnum pulcherrimum B. & C. Hooker's Jour. Bot. and Kew Gard. Misc. 1: 235. 1849.

Plant pileate, sometimes effused subresupinate, sessile, more or less imbricate, confluent at base, the mass 10–20 cm. wide, 5–10 cm. long, 5–7 cm. thick; pileus horizontal, subconvex, dimidiate to subflabelliform; surface uneven, azonate, densely strigose or tomentose, the hairs up to 2 mm. in length, white at first becoming ochraceous to tawny or reddish-tawny; margin thin, entire, subrepand, substerile; substance soft, juicy, fibrous when fresh, fibrous-tough, flexible, somewhat soft and gummy when dry; teeth slender, terete, glabrous, ochraceous to reddish, translucent, gummy when dry, 1–5 mm. long, 3 and 4 to one millimeter; spores oblong, smooth granular, hyaline, 2–2.5 by 4.5–5 μ, very transparent with one or more dark granules.

HAB.: On decaying logs of *Hicoria*, *Quercus*, and *Liquidambar.* Throughout the year.

RANGE: Massachusetts, *Blake;* New York, *Underwood, Cook;* New Jersey, *Underwood;* Pennsylvania, *Sumstine;* Dist. of Columbia, *Cook;* Delaware, *Commons;* South Carolina, Georgia, *Ravenel;* Florida, *Calkins, Rolfs;* Alabama, *Underwood;* Louisiana, *Langlois, Lloyd;* Ohio, *Morgan.*

EXSICC.: Ellis & Everhart, N. Am. Fung. 2d. Ser. 2308.

The species appears to be chiefly southern in its distribution, being particularly abundant in the Gulf States. The northern collections are relatively few and many of the plants differ from the typical specimens when dried in being less gummy and flexible, with apparently longer teeth, and a less tomentose surface. Possibly a more careful comparison of the living plants may enable us to separate a distinct northern species, but plants from Pennsylvania are evidently identical with the more southern form.

7. **Steccherinum agaricoides** (Swartz)

Hydnum agaricoides Swartz, Prodr. 149. 1788.
Hydnum discolor Fries, Sys. Myc. **1**: 411. 1821.

Plant pileate, sessile, solitary; pileus semiorbicular, narrowed to a point of attachment, convex, 4 cm. across; surface smooth, scabrous toward the margin, where it is obscurely zonate, whitish, becoming dark ferruginous; substance fleshy, brittle when fresh, becoming tough, whitish; teeth slender, cylindrical, obtuse or acute, crowded, translucent, ferruginous brown, 4–6 mm. long.

HAB.: On dead logs.

RANGE: Jamaica, *Swartz.*

ICON.: Berkeley, Ann. and Mag. Nat. Hist. **10**: 380. *pl. 10. f. 9.*

I have not seen a specimen of this species and the above description is adapted from Swartz's description of *Hydnum agaricoides* and Berkeley's redescription and figure, *loc. cit.*

The plant appears to be a distinct species and is evidently closely related to *S. pulcherrimum.* Fries' description of *Hydnum discolor* is taken almost wholly from Swartz, Fl. Ind. Occ. **3**: 1927, but why he changed the name is not apparent.

8. **Steccherinum septentrionale** (Fries)

Hydnum septentrionale Fries, Sys. Myc. **1**: 414. 1821.
Climacodon septentrionalis Karsten, Rev. Myc. **3**[1]: 20. 1881.

Plant pileate, sessile, consisting of many pilei, crowded, imbricate, confluent at the base, the whole mass arising from a single relatively small point of attachment 2 cm. wide and spreading out into a hemispherical mass 30 cm. in diameter; the pilei arranged in uniform horizontal layers smaller at the top and bottom and larger in the center, convexed to depressed, subdimidiate, 4–30 cm. wide, 2–20 cm. long, 1–3 cm. thick; surface uneven, subrugose, floccose pubescent, azonate, white; margin incurved, repand, obtuse, subfertile; substance tough, fibrous, moist, obscurely zonate, white; teeth terete to subangular, flexible, tough, somewhat brittle when dry, long, crowded, milk-white, becoming buff to reddish when dried, 15–17 mm. long, 0.5–1 mm. wide, 1 and 2 to one millimeter; spores smooth, oblong, obliquely apiculate, hyaline, finely granular, 3–3.5 by 5–7 μ.

Hab.: On trunks of dead or dying *Fagus* emerging from knots, also on *Nyssa*, *Acer*, *Ulmus*.

Range: Canada, *Dearness;* Massachusetts, *Blake;* New York, *Underwood;* New Jersey, *Ellis;* Pennsylvania, *Haines*, *Everhart*, and *Jefferis;* Ohio, *Lloyd*, *Kellerman;* Indiana, *Underwood*, *Banker*, *Cole*.

Icon.: Fries, Icon. *pl. 9, 10.*

Exsicc.: Ellis, N. Am. Fung. 318; Ellis and Everhart, Fung. Columb. 304.

The species resembles *S. pulcherrimum* Berk. somewhat but is larger coarser and of tougher and dryer substance. It is chiefly northern in its distribution and may represent a northern type of the former species. The above description was made from a fresh plant of typical form. The semiglobose form of the mass made up of horizontal pilei standing out at right angles to a vertical orbicular disk is a very characteristic form of the plant and is well shown in Fries' figure, *loc. cit.* The disk is separable from the substratum, being permanently connected only by the small point at which the fungus emerges from the tree. As the mass becomes very large and heavy, sometimes weighing 27 pounds, it often breaks off from the trunk and falls. Some plants appear to grow more diffuse and lose the regular orbicular character. Such a one is shown in Atkinson's College Botany, 553. It seems possible that this may represent a different species or at least a variety but I have not seen a living plant of this type. Because of the immense size of this plant ordinary herbarium specimens are mere

fragments and give little idea of many important characters of the species. Even these show considerable differences but without knowing the habit and general character of the plant from which they were obtained, it would be impossible properly to discriminate species.

9. Steccherinum adustum (Schw.)

Hydnum adustum Schweinitz, Syn. Fung. Car. Sup. 77. 1818.

Plant pileate, stipitate to subsessile, more or less complicated; pilei usually several, medium size, the mass 4–8 cm. wide, subdimidiate, reniform or sometimes flabelliform, lateral, rarely spreading around behind the stipe and becoming by confluence subregular, subplane, convex, depressed toward the stipe, roughened above with more or less abortive pileoli, 2–6 cm. wide; surface subeven, finely pubescent, whitish to buff and reddish-umber toward the margin, more or less obscurely zonate; margin thin, acute, fertile to substerile; substance fibrous, dry, whitish to pale buff, brittle when dry, 2 mm. or less thick; stem short stout, subcylindrical to irregular or compressed, more or less enlarged below, velvety pubescent, solid, hard, whitish within, branching above often into a series of lateral pilei; teeth slender, tapering, crowded, straight, angular to subterete, acute, often forking and fimbriate, sometimes flattened and confluent forming concentric bands of pores, subdecurrent, white, becoming ochraceous to umber or fuscus, sometimes bluish, 1–3 mm. long, 0.1–0.2 mm. wide, 4 and 5 to one millimeter; spores oblong, smooth, hyaline, granular, obliquely apiculate, minute, 1–1.5 by 3 μ.

HAB.: On dead decaying, half buried branches. Aug.–Nov.

RANGE: Connecticut, *Underwood & Earle, White;* New York, *Earle;* New Jersey, *Ellis;* Pennsylvania, *Sumstine, Jackson;* Virginia, *Maxon, Murrill;* North Carolina, *Memminger;* Alabama, *Earle;* Ohio, *Lloyd, Morgan;* Kentucky, *Lloyd;* Iowa, *Holway;* Missouri, *Demetrio, Glatfelter.*

ICON.: Schweinitz, *op. cit. pl. 2. f. 7–9.*

EXSICC.: Rabenhorst-Winter, Fung. Eur. 3324; Ellis, N. Am. Fungi. 317.

The species presents a considerable amount of variation in form and coloring. The plant is usually white throughout at first becoming darker on the teeth and margin with age or in drying. The darkening of the margin and teeth in some cases becomes only a deep buff and in other cases becomes a dark lavender or blue which sometimes spreads more or less over the pileus.

In some instances also the formation of pores by the coalescence of the teeth is carried so far that one might be deceived into supposing that the plant belonged to the Polyporaceae.

10. **Steccherinum adustulum** sp. nov.

Plant pileate, stipitate or sessile, rarely resupinate, often deformed; pileus dimidiate, reniform, flabelliform, or irregular depressed, sometimes infundibuliform; surface radiately fibrous, obscurely zonate, minutely pubescent, white with pale brownish zones, becoming cream-colored when dry, 0.5–4 cm. wide; margin thin, acute, crimpled when dry, subfimbriate, substerile; substance tough, fibrous, white, brittle when dry, very thin, less than 1 mm. thick; stem usually slender, commonly more or less deformed, excentric, lateral or wanting, solid, velvety pubescent, enlarged at the base; teeth slender, crowded, flexuose, subterete or flattened, often forked, puberulent, less than 2 mm. long, 5 and 7 to one millimeter, white becoming cream-colored to pale ochraceous, not turning dark; spores ovoid, smooth, granular, hyaline, 1.5 by 2.5 μ.

Hab.: On rotten sticks on ground in woods. July.

Range: New York, *Lobenstine*, *Banker;* New Jersey, *Ellis*.

The species shows considerable degree of variation from mesopodous through pleuropodous to apodous and even resupinate forms. The most common form is that of a horizontal dimidiate or reniform pileus with lateral, vertical or inclined stipe. In some cases the base of the stipe spreads out over the substratum, and producing teeth forms a resupinate portion of the plant. More commonly, however, the resupinate forms simply have the margin reflexed or without flexure projecting from the substratum as a pileus. When wholly resupinate the plant is scarcely distinguishable from some forms of *S. ochraceum*, but I have always found these associated with the pileate plants in such a way that there was no question as to the identity of the species. The pileate forms show very close relationship to *S. adustum* and the plant has usually been referred to that species, but it differs in its smaller size, more delicate structure, slender flexuose almost capillary teeth, its permanent light color throughout showing no trace of an "adustus" margin or teeth, and finally its ovoid and shorter spores. I have found this plant common in mixed woods about Schaghticoke, N. Y., but have never found *S. adustum* in that region. The spores of

the dried plant when mounted in water appear shriveled and may be thought to be curved and with peculiar dark bands. This appearance may be of some value in separating species, but it entirely disappears if the spores are mounted in weak potassic hydrate and they appear then distinctly ovoid and highly transparent.

11. Steccherinum plumarium (B. & C.)

Hydnum plumarium B. and C. Jour. Linn. Soc. **10**: 324. 1869, not *H. plumarium* B. and C. Grevillea **1**: 97. 1873.

Plant stipitate, pileate, about 5 cm. long; pileus apparently flabelliform, branched; branches flattened vertically and broadening outwardly, 0.5–3 cm. long, 1–20 mm. wide, in color white or pale alutaceous to reddish, subzonate, darker toward the margin and underneath; surface smooth, to subrugose, margin thin, deeply laciniate, apparently sterile; stem, 1.3 cm. long by 1.5 mm. thick; substance membranaceous, subtranslucent, showing zonations distinctly by transmitted light, fibrous, thin, less than 0.5 mm. thick; teeth minute, irregularly distributed, occasionally on both sides of pileus, blunt, conical, or flattened, often united at the base into longitudinal ridges, from which the tips of the teeth project like crests, the ridges sometimes appearing to anastomose forming pores and giving rise to the feature described by Berkeley as a porous hymenium; teeth similar in substance to the pileus, 0.2–0.8 mm. long, 0.07–0.09 by 0.09–0.27 mm. wide; spores hyaline, smooth, subglobose-ovoid, guttulate, 3.6 × 5 μ wide.

HAB.: On stumps in woods. June–July.

RANGE: Cuba, *Wright;* Jamaica, *Maxon 2949.*

Berkeley's original description is unsatisfactorily brief and the above description drawn up from dried material may perhaps be supplemental. The species, however, should be easily recognized as it is wholly unlike anything else in the Hydnaceae. Its deeply laciniate, palmately branched pileus and membranaceous substance clearly distinguish it from all other pileate species. Its minute teeth, however, may cause it to be overlooked as a member of this family.

SPECIES DUBIAE ET INQUIRENDAE

Hydnum decurrens Berk. & Curt., Jour. Linn. Soc. **10**: 325. 1869. The species was described from material from Cuba. The type specimens show a plant closely resembling forms of *S. Rhois* differing chiefly in the teeth which appear to be more

slender and to have a lilac tint rather than ochraceous. It is probable that it is a good species, but as no specimens except the type are known and a satisfactory description is not possible at present, it seems best not to include the species in the present genus until it can be further studied. If specimens are found they will probably be traced through the key to *S. ochraceum* or *S. Rhois* from either of which they will probably be distinguished by the lilac colored teeth.

Hydnum friabile Fries, Nov. Symb. Myc. 106. 1855. The species was described from material received from Curtis. From the description it appears very close to *H. pulcherrimum* B. & C., and it would be regarded as a synonym of that species but for the fact that Fries himself notes this fact and says "*H. pulcherrimum* Berk. et Curt. aculeis multisque notis conspicue differt." In view of this definite statement it is best not to reduce the species to synonymy until the type specimen can be examined.

Hydnum molle Schwein. Syn. N. Am. Fung. 162. 1834. Not *H. molle* Fries. The description is brief and suggests the possibility of the species belonging to the genus *Irpex* of the family Polyporaceae.

Several European species related to the present genus have been credited to this country, but as I have not seen the specimens they have not been included in the synopsis. These are as follows: *H. occarium* probably intended for *H. occarinum* Batsch reported by Schweinitz from Pennsylvania. No specimen was found in the Schweinitz Herbarium. *H. cirratum* Pers. often written incorrectly *cirrhatum*, reported from Alabama, *Beaumont;* Ohio, *Lea;* North Carolina, *Curtis;* New York, *Peck;* Kentucky, *Morgan.* It seems probable that the plants thus reported are *H. pulcherrimum* or *H. septentrionale. H. geogenium* Fr. reported from New York, *Peck.* The plant may be of this species but the determination is not wholly satisfactory.

4. ECHINODONTIUM Ellis & Ev. Bull. Torrey Club 27: 49. 1900

Hydnofomes Hennings, Hedwigia 28: 267. 1901.

Plant apodous, hard, woody, perennial; teeth woody; hymenium beset with setae; spores smooth, guttulate, hyaline.

1. ECHINODONTIUM TINCTORIUM Ellis & Ev. Bull. Torrey Club 27: 49. 1900

Fomes tinctorius Ellis & Everhart, Bull. Torrey Club 22: 362. 1895.

Hydnum tinctorium Lloyd, in Ellis & Everhart, Bull. Torrey Club 27: 49. 1900.

Hydnofomes tsugicola Hennings & Shirai, Hedwigia 28: 267. 1901.

Plant pileate, dimidiate, sessile, subungulate, perennial, 13 cm. wide, 7 cm. long, 1–5 cm. thick; surface sulcate-zonate, tomentose, rimose, dirty brown to fuliginous at margin; margin thick, rounded, even; substance fibrous woody, ferruginous to bright red, growing downward about the teeth so that they become more or less imbedded; teeth stout, compressed to flattened, blunt or dentate, drab, covered with a whitish pubescence and with scattered reddish conical setae 15–20 μ long, woody, center red, similar in substance with the pileus, 1–2 cm. long by 1–3 mm. wide; spores hyaline, broadly elliptical, smooth, 4.5–5 by 6–7 μ.

HAB.: Parasitic on *Abies* and *Tsuga*. July.

RANGE: Alaska, *Swan;* Washington, Idaho, *Piper.*

The type specimen from Alaska is in the New York Botanical Garden. It has the teeth all broken off and thus looks as though the hymenial surface was composed of pores. This, together with its woody character, so entirely unlike anything previously known in the Hydnaceae misled Ellis and caused him to describe it as a *Fomes.* Later a more perfect specimen coming to hand he established the genus *Echinodontium* for this species.

In 1901 Hennings established the genus *Hydnofomes* on *H. tsugicola* Henn. & Shir. a plant found on *Tsuga diversifolia* Shir. in Japan. The species, however does not seem to differ essentially from the American plant. Hennings gives spore measurements somewhat larger, 5–7 by 4–5 μ and says, "pileis imbricatis decurrente effusis."

The species is unique among the Hydnaceae and shows a close relationship to the woody Polyporaceae.

5. SARCODON Quélet; Karsten, Rev. Myc. 3^1: 20. 1881

Plants usually terrestrial, mesopodous, fleshy, more or less brittle, generally dark colored, brown to fuscous or black, rarely light brown or gray; teeth terete rarely compressed; spores small 4–7 μ

wide, subglobose to ovoid, coarsely tuberculate, often appearing irregular, dark colored usually brown to fuscous, occasionally pale.

The first genus ever organized out of the group of plants now known as the Hydnaceae was established by Dillenius, *Catalogus Plantarum circa Gissam nascentium* 188, *pl. 1.* 1719, and was called *Erinaceus.* The plant described and figured in the above cited reference was undoubtedly the one now known as *Hydnum repandum* L. In 1735* Linnaeus, *Systema Naturae*, proposed the name *Hydna* as a substitute for *Erinaceus* Dill. Later the name was changed to *Hydnum* and finally it appeared in the *Species Plantarum* 1753 with four species listed under it, namely, *H. imbricatum*, *H. repandum*, *H. tomentosum* and *H. auriscalpium.* According to the principles here followed, although *H. imbricatum* (the type of *Sarcodon*) was the first species mentioned, *H. repandum*, the original *Erinaceus* of Dillenius, becomes the type of the genus *Hydnum.*

The genus, as thus originally established by Dillenius and reëstablished by Linnaeus, was so natural and clearly marked by its awl-shaped teeth that it has never been called in question, and the only confusion that has ever arisen concerning it has been from a failure to follow an obviously fundamental principle of nomenclature. Even if one does not accept the modern doctrine of generic types, it must be admitted that at least some one or more of the species given under a genus by its author at the time of its publication must be regarded as such type, otherwise there is no ground for generic stability and the very expression "generic type" is meaningless. It is to be observed that the genus *Hydnum* as established in 1753 by Linnaeus consisted wholly of stipitate plants, and it is absurd to restrict the name to resupinate forms.

The toothed hymenium was so obvious and distinctive a character of these plants that it became customary to refer everything possessing this feature to *Hydnum* until the genus became loaded

* In my "Historical Review of the Genera of the Hydnaceae," Bull. Torrey Club 29 : 438, it was stated that the name Hydna was proposed in 1737. I had not then seen a copy of the rare first edition of the Systema Naturae. I have to thank Dr. Barnhart for calling my attention to Fee's reprint. From this it appears that the facts are as stated in the text.

down with an incongruous mass of forms having only one common characteristic, that is a toothed hymenium. Several attempts have been made to evolve from this chaos something like a generic homogeneity. These efforts have not been without success but have unfortunately been in most cases largely vitiated by a failure to regard any definite principles of nomenclature.

In 1878 Quélet, in the *Clavis Hymenomycetum* proposed to restrict the name *Hydnum* to the resupinate forms of the genus and then suggested the name *Sarcodon* for the fleshy mesodopous forms. His treatment of *Hydnum* as a genus of resupinate species has no justification in any rational system of nomenclature, since not one of these forms was recognized under the original Linnaean genus or even its prototype, the *Erinaceus* of Dillenius. Moreover, Quélet failed to establish his genera in accordance with any rational principles* and his work might be wholly ignored but for the fact that his absurd perversion of nomenclatorial principles was taken up by so careful and discriminating a botanist as Karsten who, strangely repudiating his own far more logical work,† gave to Quélet's labors a recognition that their intrinsic merit did not deserve. In this Karsten has been followed by Patouillard, Schroeter and Hennings, much of whose work is, therefore, built nomenclatorially upon a foundation of sand.

The genus as here treated is closely related to *Hydnum* L. on the one side, and to *Hydnellum* Karst. on the other, differing from the former in the generally dark color of the plants and especially in the character of the spores; from the latter it differs chiefly in the brittle fleshy substance.

Synopsis of the Species

Spores pale; teeth connected at base by anastomosing ridges.
1. *S. reticulatus.*

Spores colored; teeth not connected by ridges.
Pileus densely tomentose or strigose. 3. *S. cristatus.*
Pileus smooth, subpubescent, or scaly.
Pileus glabrous, grayish.
Plant large, 8–12 cm. wide; stem scabrous. 2. *S. scabripes.*
Plant medium, 2–6 cm. wide; stem smooth. 4. *S. Blackfordae.*

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* See p. 102.

† Symb. ad Myc. Fenn. in Medd. Soc. Faun. et Fl. Fenn 5: 26. 187.

Pileus thin, blackish or dark olivaceous, small, less than 3 cm. wide. 10. *S. atro-viridis.*

Pileus fuscous or some shade of brown or red.*

Pileus thick; stem stout, usually shorter than the width of the pileus; teeth coarse usually more than 5 mm. long.

Surface of the pileus smooth or subpubescent. 6. *S. laevigatus.*

Surface of pileus more or less scaly. 7. *S. imbricatus.*

Pileus thin; stem slender, length equal or greater than width of pileus, teeth fine, less than 5 mm. long.

Surface of pileus smooth or subpubescent; stem radicating; plant small. 5. *S. fuligineo-violaceus.*

Surface of pileus more or less scaly.

Plant small; scales fine; flesh drying thin, hard, dark, subtranslucent. 9. *S. Underwoodii.*

Plant large; scales coarse; flesh drying opaque, fibrous, somewhat soft or pithy, tan colored. 8. *S. fennicus.*

1. **Sarcodon reticulatus** sp. nov.

Plant low, broad, alutaceous to terra-cotta; pileus plane or slightly depressed, somewhat irregular and slightly uneven, 7–15 cm. wide, more or less confluent; margin thin, incurved, subrepand, sterile; surface at first tomentose or pubescent, at length smooth or subsquamulose in the center of the disk, alutaceous to reddish at center fading out to pale buff or white at margin; substance fleshy, somewhat fragile, but of fibrous structure, whitish; stem short, stout, obconic, solid, 2–4 cm. long by 1–3 cm. wide, subattenuate below and largely buried in the sand, so that the pileus seems to rest on the ground, smooth, concolorous with pileus; teeth terete, slender, tapering, acute, subtriangular in cross-section at the base and coalescent so that when the teeth are broken away they leave an anastomosing network of low irregularly thickened ridges, interior darker than the outside and subtranslucent, color of surface whitish to cinereous, subdecurrent, 2–6 mm. long, 0.25–0.35 mm. wide, 3 or 4 to one millimeter; spores white to pale yellow, subglobose, tuberculate, 3–3.5 μ wide; taste mild; odor not distinct.

HAB.: On the ground in dry sandy pine woods, more or less covered with leaves, pine needles, and sand so as to be unnoticeable. Nov.

RANGE: New Jersey, *Copp.*

EXSICC.: Ellis N. Am. Fung. 929.

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* From this point the synopsis is not very satisfactory as the species are not well understood and there are many forms that require more careful field work.

The type of this species is a plant of the Ellis collection at the New York Botanical Garden and marked "3716 *Hydnum fragile* Fr. det. Cooke." The above description was written partly from the dried plant and partly from notes of Ellis made on the fresh plants collected at Iona, N. J. Ellis first referred these plants to "*H. laevigatum* Fr." but afterwards, perhaps by the influence of Cooke, referred them to *H. fragile* Fr. and under the latter name they were distributed in his N. Am. Fung. as No. 929. The plant, however, appears to be a very distinct thing. It is the only fleshy species I know of with pale tuberculate spores, and in some of its characters it appears to stand intermediate between the genus *Hydnum* and the genus *Sarcodon*. The tuberculate feature of the spores, the fibrous somewhat tough character of the flesh, together with the general habit of the plant point to its affinities with the latter genus. In the dried specimens the anastomosing ridges connecting the base of the teeth is a very marked and constant character and suggests the specific name.

Only the one collection is known. The color and habit of the plant are likely to cause it to be overlooked.

2. **Sarcodon cristatus** (Bres.)

Hydnum cristatum Bres.; Atkinson, Jour. Myc. 8: 119. 1902.

Plants terrestrial, mesopodous, yellowish 6–10 cm. high; pileus convex to subplane, more or less uneven, irregular, 3–10 cm. wide; margin subrepand, sterile; surface densely velvety tomentose to strigose hairy, in the latter case the hairs forming more or less anastomosing ridges or crests, the hairs usually branching, disc often floccose, color tan or ochre yellow, at margin lighter to whitish; substance fleshy to somewhat tough, pale brown; stem stout, solid, subcylindrical or tapering somewhat to the base, subvelutinus or with spine-like crests of strigose hairs, tawny, 1–5 cm. long by 1–2 cm. wide; teeth slender, terete, even, obtuse, decurrent, tawny olive to fuscous becoming dark brown with whitish tips in drying, "3–6 mm. long," when dried 2–3 mm. long by 0.1–0.3 mm. wide, 2 or 3 to one millimeter; spores subglobose, tuberculate with small warts, 4–5 μ wide, "tawny olive on paper"; taste acrid.

HAB.: Ground in mixed woods. Aug.–Sept.

RANGE: Connecticut, *Earle 1113;* Long Island, N. Y., *Peck and Earle 880;* New Jersey, *Ellis;* North Carolina, *Atkinson, 11127.*

The type specimens, which are from North Carolina, *Atkinson*, have the surface of the pileus covered with reticulate ridges which on their upper edges break up into coarse, strigose, branched, hair-like processes. Plants found at Port Jefferson, L. I., *Peck and Earle 880*, differ from the above in having this characteristic reduced to a fine, soft, velvety tomentum, but careful examination shows it to be essentially the same structure. The plants of both the above collections appear in the dried state, light brown in color with little or no tinge of yellow. Similar plants found formerly by Peck in this same locality were referred to *Hydnum mirabile*.* But that species is described as having the lower part of the pileus and the stem woody to corky, whereas in the present plants there is no doubt of its fleshy character although the stem dries quite hard. The difference in texture between the upper and lower strata of the pileus does not appear so conspicuous a feature as Fries's figure and description would lead one to expect. In our plant the tomentose feature appears to be wholly superficial.

Specimens in the Ellis collection from New Jersey under the herbarium name *Hydnum ochroleucum* † have the tomentum of the pileus intermediate in coarseness between the type specimens and *P. & E. 880*. The color of the dried plants also is decidedly yellowish or ochraceous brown, as though this feature for some reason had been better preserved in drying.

There seems good reason, as was suggested by Peck, to refer these plants to *Hydnum acre* Quél. The only marked difference I find in the descriptions is that the European plant is smaller. But in the absence of authentic specimens of the latter plant it seems best to treat *S. cristatus* (Bres.) as a good species.

3. **Sarcodon scabripes** (Peck)

Hydnum scabripes Peck, Rept. N. Y. State Mus. Nat. Hist. 48 : 111. 1895.‡

Plant terrestrial, mesopodous, medium to large size; pileus subregular to reniform, in large specimens sometimes lobed, convex, slightly depressed at center, 3–7 × 4.5–7.5 cm. wide; surface even, subpuberulent to glabrous, light gray, usually with a pinkish

* Rept. N. Y. State Mus. 50 : 111.

† I cannot find that this name has ever been published.

‡ Two editions of this report were issued, with different pagination. The second edition in quarto is more commonly met with.

tinge more pronounced toward center; margin strongly decurved, thin, acute, sterile; substance fleshy, brittle, whitish turning dark to nearly black when bruised, 1–1.5 cm. thick near center; stem short, stout, solid, terete, or compressed, somewhat swollen toward base, inclined, excentric to lateral, concolorous with pileus becoming darker toward base, scabrous dotted with abortive teeth; teeth short, stout, terete, subacute, irregular in length, uniformly short to lacking toward margin, decurrent becoming abortive, pale-gray to whitish turning dark when bruised, 1–5 mm. long, 1 and 2 to one millimeter; spores brown, tuberculate, uniguttulate, subglobose to ovoid, 7–7.5 × 7.5–9 μ; taste mild, agreeable.

HAB.: Under hemlock and oak trees. Aug.–Sept.

RANGE: New York, *Peck*, *Banker*.

The type specimen is larger than those described above, being 10–12 cm. wide. It is but just to say that Dr. Peck does not think the above described plants represent his species, but except in size I cannot distinguish any essential difference. It is wholly unlike anything I have seen and is evidently a good but rare species. As the plant is large and conspicuous in appearance it seems remarkable that it has not been more often found.

4. **Sarcodon Blackfordae** (Peck)

Hydnum Blackfordae Peck, Bull. Torrey Club **33**: 218. 1906

Plant terrestrial, mesopodous, medium size; pileus fleshy, convex, 2.5–6 cm. wide; surface glabrous, even, grayish or greenish gray, sometimes slightly pinkish, becoming dark in drying; substance fleshy, whitish with reddish stains, slowly becoming darker on exposure; stem equal or slightly tapering downward, solid or stuffed, becoming hollow in drying, glabrous, colored like the pileus, subcentral, 2.5–4 cm. long, 3–4 mm. thick; teeth subulate, yellowish-gray, becoming brown with age or in drying, 2–5 mm. long; spores brown, subglobose, tuberculate, 8–10 μ broad.

HAB.: Mossy grounds in low wet woods.

RANGE: Massachusetts, *Blackford*.

Only the type plants at Albany are known.

5. SARCODON FULIGINEO-VIOLACEUS (Kalch.) Quélet, Ench. Fung. 189. 1886.

Hydnum fuligineo-violaceum Kalch.; Fries, Hym. Eur. 602. 1874

Plants terrestrial, gregarious, small, 3–4 cm. high, brownish; pileus subconvex, uneven, subirregular, 4–6 cm. wide; margin

thin, sterile, decurved; surface subpubescent to smooth, sometimes with small innate scales, light brown or ochraceous brown with darker areas; substance fleshy, somewhat tough, light brown, lighter than the surface; stem subflexuose, somewhat inclined, excentric to central solid, subeven, abruptly narrowing below to a slender root-like base, 2–2.5 cm. long, 1–1.5 cm. wide; teeth fine, terete, tapering, decurrent more or less scatteringly to the root-like base, seal brown to flesh color at the tips, when dry a uniform tawny brown, short teeth scattered about among the long, 1.5–2 mm. long, 0.1–0.2 mm. wide, 3 or 4 to one millimeter; spores subglobose, tuberculate, 4–5.5 μ wide, brown; taste mild; odor of slippery elm.

Hab.: In dry mixed woods. July–Oct.

Range: Connecticut, *Earle 580;* New York, *Banker 724;* New Jersey, *Ellis.*

Icon.: Kalchbrenner, Icon. Hym. Hung. *pl. 32. f. 2.*

The type specimen is European. The American plants differ from Kalchbrenner's figure and description only in color, being of a tawny or ochraceous brown to umber rather than "fuligineo-violascens cum tinctura passim vinoso-rubella." But Ellis notes in his specimens "a slight purplish tinge to the pileus" and says the flesh has a "slight violet tint when freshly broken." This seems to confirm our determination of the plant as Kalchbrenner's species. Ellis regarded the plant as an undescribed species, but I do not find that he ever published it. Bresadola* says that Kalchbrenner's figure is poorly colored and rather represents *Hydnum amarescentem* Quél. His own figure does not so well represent our plant either in color or form.

The radicating stem is a very marked feature of the plant. Specimens occasionally show a tendency to develop scales. Ellis remarks that the plant "is about the size and much resembles *H. imbricatum*," doubtless having reference to the plant described in this paper as *S. Fennicus* Karst. The plant does have a close resemblance to the latter species, and in New York I found the two species closely associated, but *S. fuligineo-violaceus* was quite distinct and definitely smaller in size.

6. Sarcodon laevigatus (Sw.) Karsten, Rev. Myc. 3^1: 20. 1881.

Hydnum laevigatum Swartz, Kongl. Vetensk. Acad. Handl. 1810: 243. 1810

* Fung. Trid. 2: 32. *pl. 139.*

Plants very large, low and broad, terrestrial, light to dark brown, 4–6 cm. high; pileus convex to depressed, subplane, irregular, somewhat uneven, sometimes confluent, 6–15 cm. wide; margin subrepand, thin, decurved, fertile; surface smooth, subpubescent, or obscurely scaly toward the center, sometimes subareolate by reason of superficial cracks, light to dark brown or fuscous; substance fleshy, fragile to somewhat tough, thick, nearly equal to the length of the teeth, pale brown, when dried often peculiarly light, soft and pithy; stem short, stout, somewhat inclined, uneven, excentric, solid, subbulbous, 3–5 cm. long, 1–2 cm. wide, concolorous with pileus or lighter; teeth coarse, slender, terete, tapering, subacute, slightly flexuose, smaller teeth scattered among the larger, subdecurrent, brown to cinereous with whitish tips, 3–10 mm. long, 0.3–0.7 mm. wide, 1 or 2 to a mm.; spores subglobose, very coarsely tuberculate, 5.5–8 μ wide, dark colored.

Hab.: On ground in woods. Aug.–Mar.

Range: Pennsylvania, *Jefferis*, *Schweinitz;* West Virginia, *Beardslee 588;* North Carolina, *Memminger*, *Schweinitz;* Alabama, *Earle*, *Lee*, *Baker.*

Icon.: Barla, Les Champ. de la Prov. de Nice, *pl. 38. f. 5, 6;* Bresadola, Fung. Trid. *pl. 138;* Fries, Sverg. ätl. Svamp. *pl. 81.*

The plants of the quoted collections vary greatly among themselves, but appear to possess no uniform characteristics by which the group can be further divided. They agree in being large, short-stemmed, with broad pilei, coarse teeth and brown color.

A puzzling fact in connection with the above collections is that the collectors themselves frequently refer their specimens to *S. subsquamosus* or even to S. *imbricatus*, which would indicate that at least in the fresh state the pileus shows some indications of scales, but there are usually no signs of scales in the dried specimens. In two or three plants of Earle's Alabama collections the central part of the pileus appears to be marked by superficial cracks into large areolae which in the fresh plant may have appeared as scales, but Swartz in his original description says "laevis nec squamosus, *medio subinde rimosus.*" [The Italics by Swartz.] We are inclined to believe, therefore, that these plants really pertain to Swartz' species.

Several of the specimens have a remarkably light soft pithy substance when dried. Whether this indicates a specific distinction or is simply a growth character cannot be determined without

more careful field notes, which in this group of plants are particularly lacking.

The plant appears to be chiefly southern in its distribution, which accounts for its remarkable seasonal range. In Alabama the fleshy fungi are most luxuriant in December and January.

7. Sarcodon imbricatus (L.) Karsten, Rev. Myc. 3[1]: 20. 1881.

Hydnum cervinum Persoon, Obs. Myc. 1: 74. 1796.
Hydnum imbricatum L. Sp. Pl. 2: 1178. 1753.
Phaeodon imbricatus Schroeter, Krypt. Fl. von Schles. 3: 460. 1888.

Plants terrestrial, mesopodous, light to dark brown or fuscous, large, 5–10 cm. high; pileus broad, subplane, depressed, subeven, somewhat irregular, 5–10 cm. wide; margin thin, decurved, fertile, subrepand; surface subpubescent, scaly, scales larger and thicker toward center of disk usually wanting toward margin, 2–8 mm. wide, subimbricate, often zonately arranged, pale brown to dark brown, darker on the scales; substance fleshy, pale brown to whitish; stem stout, usually uneven, often inclined, more or less excentric, solid or perforate, concolorous with pileus, 2–9 cm. long, 1.5–3 cm. wide; teeth coarse, terete, tapering, acute, sometimes forked; usually decurrent, brown, light brown or cinereous, 1–10 mm. long, 0.25–0.7 mm. wide, 1 or 2 to one millimeter; spores subglobose, tuberculate, 5.5–7 μ wide, brown.

Hab.: In woods. July–Aug.

Range: Connecticut, *Underwood & Earle 1154;* New York, *Peck;* Alabama, *Underwood & Earle, Burton;* Wyoming, *Nelson 4197;* Montana, *Tweedy 6.*

Icon.: Barla, Les Champ. de la Prov. de Nice, *pl. 38. f. 1–4;* Fl. Dan. *pl. 176;* Harzer, Naturg. Abb. der Pilze, *pl. 3. f. 6–8;* Fries, Sverig. ätl. Svamp. *pl. 33:* Patouillard, Tab. Analyt. Fung. *pl. 245;* Greville, Scot. Crypt. Fl. *pl. 71;* Atkinson, Mushrooms, etc., ed. 1900; *f. 189; Idem*, ed. 1901; *f. 200;* Dietrich, Forstflora, ed. 1840; 2: *f. 187; Idem*, ed. 1860; 2: *pl. 291. f. 2.*

Exsicc.: Krieger, Fung. Sax., 419; Linhart, Fung. Hung., 347; Roumeguere, Fung. Select. Exsicc., 5328; Sydow, Myc. March., 105; Herpell, Samml. präp. Hutp., 75.

The plants referred to this species present considerable variation and the segregation here effected is not wholly satisfactory. They

agree in the large size, stout stems, coarse teeth, broad pilei, and distinct imbricate scales of the pileus. If it were not for the latter character many of the plants could not be separated from forms of *S. laevigatus* and the group presents much the same difficulties as were met with in that species. As the presence or absence of scales on the pileus appears to be an artificial distinction, it is possible that a more thorough study of the forms of these related species will show that the true line of specific cleavage must ignore this character. In the collections quoted not a single field note has been made and the description has been prepared entirely from the dried specimens. It is undoubtedly too broad. Many of the plants appear to be sufficiently marked as to warrant their being regarded as distinct species. But with such meager material and no field notes it does not seem best to attempt a specific description. Some of the conspicuous distinctions may be noted as follows: "Ala. U. & E.," teeth not at all decurrent; "Nelson, 4197," stem hollow and scaly within; "Tweedy, 6," remarkably thick prominent scales. I regard the Connecticut and New York specimens as typical examples of *S. imbricatus* The fact is *S. imbricatus* is not so common in this country as has been supposed and the forms so commonly referred to that species need to be more critically studied in the field. Besides peculiarities of scales and teeth it should also be noted before drying whether the stem is solid, stuffed, or hollow as in drying it frequently becomes excavated and so appears to be hollow.

The European icones quoted are the most uniform and satisfactory of the many examined but even then some notable differences are to be observed. Barla represents a plant with violaceous teeth and stem and Fries shows a hollow or perforate stem. Fries' figure differs from Nelson's plant in its much longer stem. Atkinson's figures are not very satisfactory; they appear to represent a deformed rather than a typical plant.

Of the Exsiccati the most satisfactory are Krieger, Herpell, and Linhart. Ellis, N. Am. Fung. 926, appears to be made up of different things some of which may constitute a distinct species.

8. Sarcodon fennicus Karsten, Rev. Myc. **9**: 10. 1887.

Sarcodon scabrosus fennicus Karsten, Ryssl. Finl. och den Skand. Half. Hattsv. **2**: 104. 1882.

Hydnum fennicum Sacc. Syll. Fung. 6: 433. 1888.
Phaeodon fennicus Hennings, Die Natürl. Pflanzenf. 1^{1**}: 149. 1898.

Plants terrestrial, mesopodous, somewhat gregarious, medium size, reddish brown or purplish; pileus convex, subumbilicate, slightly uneven, 4–8 cm. wide; margin thin, fertile, inflexed; surface broken up into small thick scales which are arranged in more or less concentric and radiating lines, scales diminishing in size toward the margin, from 5 mm. wide to floccose points, color of pileus dark brown to reddish brown or purplish darker on the scales; substance fleshy, fibrous, brittle, light brown (when dried fibrous, pithy, opaque, light brown); stem subflexuose, usually strongly inclined, attenuate to the base, concolorous becoming very dark at the base, solid, 4–6 cm. long, 8–15 mm. wide; teeth terete, slender, acute, scatteringly decurrent, dark umber at base to whitish at tips, 3–4 mm. long, 0.2–0.3 mm. wide, but with many minute teeth scattered irregularly among the others; spores subglobose, tuberculate, 6–7 μ wide, brown; taste bitter.

HAB.: On ground in mixed woods. Aug.–Oct.

RANGE: Massachusetts, *Seymour;* New York, *Banker 735, Peck;* New Jersey, *Ellis;* Kentucky, *Morgan;* Tennessee, *Murrill.*

The plant has been usually referred to *S. imbricatus* on the basis of its scaly pileus but it differs from that species in its smaller size, more slender stem, finer teeth, reddish color, and the dark usually bluish base of the stem. Many of the specimens distributed by Ellis in N. Am. Fung. under No. 926 (*H. imbricatum*) apparently belong to this species.

9. **Sarcodon Underwoodii** sp. nov.

Plant terrestrial, mesopodous, small to medium size; pileus subplane, depressed, irregular, 6–10 cm. wide; margin thin, inflexed, fertile with short teeth; surface covered with small narrow scales more or less floccose toward margin, mostly 1–2 mm. wide, ends upturned, subzonately arranged, color pale brown or tan, somewhat darker on the scales, grayish brown toward the margin; substance fleshy, whitish, drying thin (less than 1 mm.), hard, dark, brown to black, subtranslucent; stem irregular abruptly tapering and radicating below, subconcolorous, scaly and roughened above by scattered spines, 3–5 cm. long, 1–3 cm. wide; teeth small, slender, terete, acute, crowded, decurrent, scattered nearly to base of stem, pale cinereous nearly white, light brown when dry, 2–3 mm. long, 0.5 mm. wide, in dried plants less than 2 mm. long, capil-

lary, 4 to 6 to one millimeter; spores globose, tuberculate, 5–6 μ wide, dark colored; taste bitter.

HAB.: Ground in dry woods. July–Oct.

RANGE: Connecticut, *Underwood and Earle 598;* New Jersey, *Ellis, Gentry.*

The type specimens are the *U. & E. 598* at the New York Botanical Garden. The plant is closely related to *S. fennicus* Karst. differing from that species in its radicating stem, the finer teeth and the dark horny appearance of the flesh when dried; the dark color at the base of the stem also appears to be lacking. The teeth in the dried plant are very brittle so that herbarium specimens are often denuded. The plant has been generally referred to *S. imbricatus* but its only claim to such disposition is the fact that it has a scaly pileus. One set of Ellis N. Am. Fung. contained a large specimen of this species under 926 (*H. imbricatum* L.)

10. **Sarcodon atroviridis** (Morgan)

Hydnum atroviride Morgan, Jour. Cin. Soc. Nat. Hist. **18**: 38. 1895.

Phaeodon atroviride Earle; Mohr. Pl. Life Ala. 205. 1901.

Plants terrestrial or lignatile, mesopodous, very dark, blackish or olivaceous, small, 1–3 cm. high; pileus convex to expanded, thin somewhat irregular, umbonate, 1–2 cm. wide; margin thin, fertile with short teeth; surface subpubescent to glabrous, dark olivaceous brown to blackish; substance "fleshy-coriaceous"; stem slender more or less deformed, often attenuate below, central or excentric, 1–2 cm. long, 0.2–0.3 cm. wide; teeth short, slender, acute, crowded, not decurrent, at first light grayish white becoming dark brown with age, 1–2 mm. long, 0.2–0.3 mm. wide, 3 or 4 to a mm.; spores globose to ovoid, tuberculate, dark fuscous or olivaceous, 4.5–7 by 7–8 μ wide.

HAB.: On ground in woods or on old wood. Sept.

RANGE: Alabama, *Atkinson, Earle.*

ICON.: Morgan, *loc. cit. pl. 1. f. 5.*

The type specimens which are in Morgan's herbarium were collected by Atkinson "on old wood," an unusual habitat for this genus. They were said to be dark green throughout even to the spores. Earle's plants were found on the ground in woods. No greenish color was observed about these plants when fresh, but

the dried plants appear dark olivaceous brown to black. On comparing the specimens, however, there appears to be no doubt as to the identity of the two collections.

Species dubiae et inquirendae

Hydnum canum Schwein. Syn. Fung. Car. 77. 1818.

The specimen in the Schweinitz herbarium throws little light on this species as it is a mere fragment and suggests a tough coriaceous plant rather than a fleshy one. Fries treated the species as a synonym of *H. gracile* and Schweinitz himself* expressed doubt as to the validity of the species.

Hydnum Curtisii Berkeley, Grevillea, 1: 71. 1872. South Carolina, *Curtis, 2809.* This is the type specimen which I have not seen. A plant found by Earle in Alabama answers in every particular to the description but looks as though it might be a young plant of *S. laevigatus* (Sw.) Karst.

The following European species have been reported from this country but for various reasons are excluded from the present enumeration: *H. subsquamosum* Batsch. has been reported several times. New England, *Sprague;* Rhode Island, *Bennett;* Pennsylvania, *Schweinitz;* South Carolina, *Curtis, Ravenel;* Alabama, *Peters.* Bennett's specimen is a tough coriaceous plant evidently closely related to *H. zonatum* Batsch. Schweinitz's specimen has been referred in this paper to *S. laevigatus* (Sw.) Karst. there being no scaliness to the pileus. The other collections have not been seen. *H. infundibulum* Swartz, has been reported from Pennsylvania, *Schweinitz;* Ohio, *Lea, Morgan;* Kentucky, *Morgan.* Schweinitz's specimen is too nearly destroyed to furnish any satisfactory idea of the plant. Morgan's Kentucky specimens may be of this species but seem very small. The Ohio specimens I have not seen. *H. fusipes* Pers. Pennsylvania, *Schweinitz.* The specimen appears to be a small or young specimen of *S. fuligineoviolaceus* (Kalch.) Quél. *H. versipelle* Fr. New York, *Fairman.* The specimen appears to be a young plant of *S. Underwoodii.*

6. HYDNELLUM Karsten, Medd. Soc. Faun. et Fl. Fenn. 5: 27. 1879

Calodon Quélet; Karsten, Rev. Myc. 3[1]: 20. 1881.

* Syn. N. Am. Fung. 161.

Plants chiefly terrestrial, mesopodous, often deformed, usually dark colored, brown, reddish to orange, sometimes whitish; substance fibrous, tough, sometimes compact, hard and woody, often in two layers the outer felt-like, soft, tomentose, the inner compact, hard; spores colored, coarsely tuberculate.

The species of this genus were originally placed by Fries in his tribe Mesopus, section Lignosa, which was made to include all tough mesopodous species of the Hydnaceae. In 1878 Quélet * proposed to raise the whole group to the rank of a genus and suggested the name *Calodon* but failed to establish the genus according to present methods. The next year Karsten, *op. cit.*, independently took up the same group raised it to generic rank and gave it the name *Hydnellum* making the proper binomial combinations which established the genus. In 1881 the last named author *op. cit.* divided the group into the white toothed and the dark toothed forms and to the former gave the name *Phellodon q. v.* but for the latter, rejecting his own well established name *Hydnellum*, he took up *Calodon* proposed by Quélet, and gave it nomenclatural standing; in which he appears to have been influenced too much by his respect for others. As Karsten's original work is logical, accurate, definite, and when he is not following others, is based on sound nomenclatorial principles, it seems right that his name should prevail.

Synopsis of the Species

Plants exuding red juice when injured.
- Plants fragrant, acrid, whitish or pale brown; surface of pileus azonate, subeven, scarcely depressed. 1. *H. Carbunculus.*
- Plants odorless, mild, reddish-brown; surface of pileus subzonate to azonate uneven, depressed to infundibuliform. 2. *H. sanguinarium.*

Plants not exuding red juice when injured.
- Surface of pileus distinctly zonate, margin whitish or pink.
  - Plants small, less than 4 cm. wide; pileus very thin. 7. *H. zonatum.*
  - Plants larger, 3–15 cm. wide; pileus thicker. 6. *H. concrescens.*
- Surface of pileus azonate or obscurely zonate, color more or less uniform or irregularly blotched.
  - Plants with more or less of orange in their color, often complicated, irregular.
    - Plants large, more than 4 cm. wide, terrestrial. 8. *H. floriforme.*
    - Plants small, less than 3 cm. wide, on cones. 9. *H. conigenum.*
  - Plants with more or less of blue in their color, not complicated.
    - Plants large, more than 6 cm. wide, whitish, horizontally zonate internally with blue, fragrant. 13. *H. suaveolens.*

*Clav. Hym. 196.

Plants small, rarely more than 6 cm. wide, drab with bluish margin; odor slight. 14. *H. cyaneotinctum.*

Plants without orange or blue; usually brown or pallid, or brick-red.

Pileus smooth, lobed, more or less complicated. 10. *H. complicatum.*

Pileus pubescent, subregular, sometimes complicated in no. 5.

Pileus of two distinct layers, the upper felty the lower compact.

Plant brown; pileus obscurely zonate; substance hygrophanous. 5. *H. scrobiculatum.*

Plant uniform cinnamon brown; stipe subcentral, substance dry.

Pileus convex; teeth stout, 0.3 mm. wide. 3. *H. velutinum.*

Pileus depressed to infundibuliform; teeth capillary, 0.2 mm. wide. 4. *H. Nuttallii.*

Plant more or less brick red, stipe lateral or sublateral. 11. *H. Earlianum.*

Substance of pileus uniform, spongy when fresh; plant large, 5–8 cm. wide, yellowish brown. 12. *H. humidum.*

1. **Hydnellum Carbunculus** (Secr.)

Hydnum Carbunculus Secr. Myc. Suis. 2: 515. 1833.

Plants terrestrial, mesopodous, gregarious, more or less confluent, low, appearing nearly sessile, broad; pileus convex to plane, rarely slightly depressed in center by no means infundibuliform, more or less uneven, not colliculose, somewhat round or irregular, 4–10 cm. wide and by confluence often 20 cm. wide; surface woolly-pubescent, often more or less floccose squamulose, azonate, whitish at first turning light brown to whitish, with irregular blotches of dark brown to nearly black where bruised or touched, these latter more or less glabrous, shining, probably from the dried juice; substance fibrous, tough, spongy, drab in the upper part of pileus, compact, hard, somewhat woody, more or less distinctly zonate in the lower part, exuding a thick red juice in the fresh plant; margin somewhat thick, obtuse, subfertile to sterile; stem stout, very short, deformed, becoming bulbous in the substratum, and sometimes subradicating, 1–3 cm. wide, 1 mm.–1 cm. long above ground; teeth slender, terete, acute, decurrent, pinkish-white, less than 5 mm. long shortening to the margin about 2 to one millimeter; spores ovoid, tuberculate, brownish, 4–5.5 μ; odor of hickory nuts, strong; taste intensely acrid.

HAB.: On ground among pine or spruce needles, usually in sand. Sept.–Dec.

RANGE: Maine, *White*; New Jersey, *Ellis*; Maryland, *Shear*; Alabama, *Earle.*

EXSICC.: Ellis N. Am. Fung. 928, as *Hydnum ferrugineum*; Ellis and Everhart, Fung. Columb. Cont. Shear, 1409, as *Hydnum ferrugineum.*

The Ellis plants found in N. Am. Fung. 928, do not appear to be typical specimens differing chiefly in color and character of tomentum but are referred here for the present. They do not give any odor in the dried state whereas the odor of the other specimens quoted is very persistent.

Secretan claimed his species to be the same as *Hydnum ferrugineum* Fries, but his description does not seem to correspond well either with Fries' description or figure, while the plants above described correspond to Secretan's description in nearly all characters. These plants have usually been referred to *Hydnum ferrugineum* Fries (see next species).

2. **Hydnellum sanguinarium** nom. nov.

Hydnum ferrugineum Fries, Obs. Myc. **1**: 133. 1815. Not *H. ferrugineum* Pers. Tent. disp. meth. Fung. **30**: 1797.

Phaeodon ferrugineus Schroeter, Krypt. Fl. von Schles **3**: 459. 1888.

Calodon ferrugineus Karsten, Rev. Myc. **3**[1]: 20. 1881.

Hydnellum ferrugineum Karsten, Medd. Soc. Faun. et Fl. Fenn. **5**: 27. 1879.

Plant terrestrial, mesopodous, subgregarious, medium size; pileus obconic, expanded, depressed to subinfundibuliform, irregular, more or less deformed, 5 cm. wide, center of disk a mass of irregular tubercles and subfertile pileoli, becoming radiating ridges toward the margin; surface densely pubescent to hirsute, shades of umber or reddish-brown throughout, sometimes obscurely zonate; margin obtuse, sterile, with blackened glabrous spots; substance spongy-fibrous toward the top of pileus, concolorous with surface of pileus, harder and darker below and through the center of the stem transversely zonate, exuding red juice where injured; stem stout, irregular, more or less deformed, surrounded toward the base by a mass of spongy tomentum, solid, 3–4 cm. long, 1–1.5 cm. thick; teeth short, terete or flattened, often concrescent, sometimes forming lamellae and pseudopores, decurrent to the tomentum of the base, surface puberulent, less than 3 mm. long; spores subglobose to ovoid, coarsely tuberculate, 4–5 μ wide; taste mild.

HAB.: On ground in dry woods. Aug.–Sept.

RANGE: Canada, *Dearness;* Maine, *White;* Vermont, *Hadley;* Connecticut, *Earle 1194;* New York, *Earle;* New Jersey, *Ellis;* District of Columbia, *Billings.*

Icon.: Fries, Icon. Select. Hym. *pl. 4.*

The species may be distinguished from related species with which it is likely to be confused by its red juice, from *H. Carbunculus* Secr., which also has red juice it may be readily distinguished by its lack of odor and mild taste. But unfortunately these characters are indeterminable in the dried plants and it is then very difficult to say with certainty to which of several species a given specimen may belong. A considerable number of collections have had to be set aside, as in the dried state, with no notes on the fresh characters, it was impossible to decide with any degree of satisfaction whether the plants represented *H. sanguinarium*, *H. concrescens*, *H. scrobiculatum*, or some undescribed form. In fact, the distribution as given above must be regarded as subject to some uncertainty. It is probable that specimens of this species are commonly referred to *Hydnum scrobiculatum* Fries, but a red juice has never been ascribed to that species. Our plants conform well to figures and descriptions of *Hydnum ferrugineum* Fries, but are rarely so large as that plant is represented. A specimen received from Bresadola presents characters intermediate between the above species and *H. Carbunculus*, having the odor and whitish pubescence of the latter, and the depressed colliculose pileus of the former. It may be that the European plant is distinct from either of our American forms. Observations on the fresh plants, including taste, odor, and character of juice, are very desirable.

H. ferrugineum Fries is preoccupied by *H. ferrugineum* Pers., a resupinate plant, and therefore the name must be changed.

3. **Hydnellum velutinum** (Fries)

Hydnum velutinum Fries, Sys. Myc. **1**: 404. 1821.

Calodon velutinus Karsten, Ryssl. Finl. och den Skand. Half. Hattsv. **2**: 109. 1882.

Hydnum spongiosipes Peck, Rept. N. Y. State Mus. Nat. Hist. **50**: 111. 1897.

Plants terrestrial, mesopodous, low, broad, dark brown throughout, gregarious, sometimes confluent; pileus obconic, subrotund, slightly irregular, strongly convex, center often depressed, 1–10 cm. wide; surface finely tomentose to pubescent, subeven, or occasionally radiately subrugose, azonate, rarely a single concentric

groove, uniform cinnamon brown ; margin subdeflexed, thin, even, substerile, occasionally with dark glabrous places ; substance felty-tomentose, cinnamon-brown in the upper part of pileus, hard, compact and darker in the lower part and extending through the central part of stem, dry ; stem short, conic, 1 cm. long, 1.5–2.5 cm. wide, surrounded at base by a dense mass of felty tomentum similar to upper part of pileus, penetrating the substratum and often as large or larger than the pileus ; surface finely tomentose, concolorous with pileus ; teeth terete, slender, straight, tapering, acute, the longest midway from margin to stem, decurrent to the bulbous base, uniform dark or light brown, lighter at the tips, puberulent, 1–5 mm. long, 0.3 mm. wide, 2 to one millimeter ; spores subglobose, coarsely tuberculate, 4–4.5 μ wide.

Hab. : On ground in dry woods. July–Oct.

Range : Connecticut, *Underwood and Earle 1093 ;* New York, *Banker, Peck & Earle 861, Atkinson, Cushier ;* New Jersey, *Ellis ;* Delaware, *Commons ;* North Carolina, *Atkinson ;* Alabama, *Atkinson ;* West Virginia, *Nuttall 880 ;* Ohio, *Morgan.*

Icon. : Patouillard, Tab. Analyt. Fung. *f. 677 ;* Gillet, Les Champ. de France, *pl. 324.*

The above collections all represent the plant described by Peck and named *Hydnum spongiosipes.* I have long hesitated on the question whether the latter name should be regarded as a synonym of *H. velutinum* Fries or stand as a valid species. Saccardo's account is copied from Fries' *Hymenomycetes Europaei* and does not fit our plant in several particulars. The original description in the *Systema Mycologicum,* however, more nearly corresponds to our plant differing only in the following points. Fries says "Substantia azona" ; our plant often shows obscurely internal zonations ; "pileus 0.5–1 unc. latus" ; our plants will average 3–5 cm. wide ; but perhaps most important Fries asserts "pileo infundibuliformi" and cites "Mich. gen. t. 72. f. 4." with the remark "icon bona," a figure which shows a very deeply infundibuliform plant, while our plant rarely is found even markedly depressed, never infundibuliform. On the other hand Fries mentions in the original description but not in his later work, with respect to the stem "tomento demum spongioso vestitus," a conspicuous and characteristic feature of our plant to which Peck in his description of *H. spongiosipes* calls special attention. Finally while the figures quoted by Fries as representing his plant all show a plant in-

fundibuliform and otherwise unlike ours, the figures in European icones drawn later as actual representations of *H. velutinum* Fries are excellent figures of our plant in all particulars. As it appears from Patouillard and Gillet's figures and from the descriptions accompanying them that *H. spongiosipes* Peck is a plant also found in Europe, the question is, did Fries really describe that plant as *H. velutinum?* It appears to me that in the absence of authentic specimens of *H. velutinum* Fries for comparison, the weight of evidence is that *H. spongiosipes* Peck is too near *H. velutinum* Fries to warrant its recognition as a distinct species.

The plant is quite common with us and maintains fairly constant characters. It can be readily distinguished from closely related species by its uniform brown color, convex or plane pileus, and its dry substance in two distinct layers.

4. **Hydnellum Nuttallii** sp. nov.

Plant terrestrial, mesopodous, medium size; pileus obconic, deeply depressed to infundibuliform, somewhat round, thickest at the center, thinning uniformly to the margin, 4–6 cm. wide, 1 cm. or less thick near the center; surface subeven, radiately subrugose or fibrillose when fresh, grayish umber; margin thin, acute, coarsely plicate or fluted, deflexed, curled when dried, subfertile with short teeth; substance spongy-tomentose in upper half of pileus, thickest at the center, umber, lower part of pileus harder more compact darker of uniform thickness about 1 mm., continuous with hard central core of stem; stem central, uneven, surrounded below by bulbous mass of spongy tomentum, 0.5 cm. wide, 4 cm. long, bulbous base 1.5 cm. wide; teeth capillary more or less decurrent, dark umber to black, 7 mm. or less long, 0.15–0.25 mm. wide, about 2 to one millimeter, longest teeth about one fourth of the distance from the stem to the margin; spores apparently few, subtuberculate, subglobose, brownish, 4–5 μ wide.

Hab.: On ground in woods. May–July.

Range: New York, *Peck;* West Virginia, *Nuttall 844;* North Carolina, *Atkinson 4340.*

Nuttall's 844 in the New York Botanical Garden is the type of the species. The plant in structure is similar to *H. velutinum* but very distinct in the form of the pileus, in its subrugose not tomentose surface, and in the long capillary teeth. Atkinson 4340 differs in some respects from the type but in characters that

seem to be accounted for by the fact that the plant was old and dead when collected.

5. **Hydnellum scrobiculatum** (Fries)

Hydnum scrobiculatum Fries, Obs. Myc. 1 : 143. 1815.

Plants terrestrial, mesopodous, gregarious, usually more or less confluent in masses, brown throughout ; pileus subregular to irregular, expanded, obconic, subplane, somewhat depressed or rarely subconvex, 2–4 cm. wide, by confluence becoming 10 cm. wide ; surface densely woolly or velvety pubescent, uneven, rugose, often colliculose and complicated by pileoli, cinnamon-brown, changeable with the light, becoming permanently dark if bruised or dipped in water which mats down the pubescence, sometimes obscurely zonate ; margin repand, straight, obtuse, sterile, lighter than disk, this is more apparent if the plant be dipped in water ; substance tough, fibrous, soft and spongy toward the upper part of pileus, more compact in lower part and center of stem, transversely zonate, dark brown, hygrophanous so that the juice may be squeezed out in drops, juice watery with a slight pinkish tinge ; stem slender, surrounded nearly or quite to the pileus by a large mass of spongy hygrophanous tomentum which is confluent with adjoining masses, surface woolly pubescent concolorous with pileus becoming dark when bruised or wet, stem near pileus 5–8 mm. wide, 5 mm. or less long to the spongy base, base 1–2 cm. wide, stem including base 2–4 cm. long ; teeth slender, terete, subcylindrical, straight, uniform in length, shortening toward margin and stem, occasionally somewhat decurrent, brown with light tips, puberulent, do not change color or become wet when dipped in water, darkening some when bruised, 3 mm. and less long, crowded, about 3 to one millimeter ; spores brown, subglobose, tuberculate, uniguttulate, 3.5 μ wide ; taste disagreeable but not acrid ; odor of rotten wood, not strong.

HAB. : On ground in dark, damp woods. Aug.

RANGE : New York, *Banker*. Other collections referred here with some doubt owing to the lack of data as to living characters, are as follows : New York, *Cushier*, *Peck ;* South Carolina, *Ravenel ;* Kentucky, *Morgan ;* Tennessee, *Murrill*. Besides these there are a large number of collections which may belong here in part and in part should be referred to *H. sanguinarium* or *H. concrescens* or possibly represent some other related species. But to diagnose these forms without knowing the living characters of the plants is mainly guess work. Only an expert thoroughly familiar with the

living and the dried plants could determine the species from herbarium specimens. I question even then if he would not be liable to some errors.

Icon.: Fries, Icon. Select. Hym. *pl. 5. f. 1.*

The description given above based on a large collection of material obtained by the writer in the summer of 1905 does not strictly conform to Fries' account of *H. scrobiculatum*, but so closely do our plants answer to Fries' description and figure that it did not seem wise to treat these plants at present as a new species. The most marked difference is Fries' statement "stipite brevissimo, nudo, radicato," while our plants have a noticeable stem, always surrounded by a mass of spongy tomentum.

6. **Hydnellum concrescens** (Pers.)

Hydnum concrescens Persoon, Obs. Myc. 1: 74. 1796.

Plants terrestrial, mesopodous, gregarious, sometimes confluent, medium size, brown with light border; pileus expanded, depressed to subinfundibuliform, normally subround, but often deformed and irregular from contact with sticks and leaves of the substratum, 3–6 cm. wide; surface finely pubescent, often colliculose at center, distinctly zonate with shades of brown, darker at the center, the outer zones a light pink to whitish, the transition being very abrupt, becoming a uniform brown throughout in drying; margin somewhat thick, rounded, sterile, even; substance fibrous, tough, dry, obscurely zonate, reddish-brown; stem short, irregular, uneven, bulbous at the base with spongy tomentum, solid, light brown, finely tomentose, 1–2 cm. long, 6–10 mm. wide; teeth slender, terete, tapering, acute, decurrent, dark brown at the base lighter at the tip, less than 1.5 mm. long, about 0.2 mm. wide; spores subglobose, tuberculate, 3–4 μ wide, brown; taste slightly bitter, unpleasant.

Hab.: On ground in dry woods. Aug.

Range: Maine, *White;* Massachusetts, *Francis;* New York, *Banker.*

The plants included in the above species are usually referred to *Hydnum zonatum* Batsch, but they differ from that species as here interpreted in their larger size, relatively thicker pileus, and decurrent teeth. Owing to the changes which the plant undergoes in drying, especially in color, it is very difficult to separate it from related species in herbarium specimens unaccompanied by field

notes. The distribution recorded above is based on plants positively identified by the aid of reliable field notes. The following collections are also referred here, but not with certainty: Connecticut, *Underwood;* New Jersey, *Ellis;* Alabama, *Underwood.*

7. HYDNELLUM ZONATUM (Batsch) Karst. Medd. Soc. Faun. et Fl. Fenn. **5**: 27. 1879

Hydnum zonatum Batsch, Elench. Fung. 111. 1783.

Calodon zonatus Karsten, Ryssl. Finl. och den Skand. Half. Hattsv. **2**: 108. 1882.

Phaeodon zonatus Schroeter, Krypt. Fl. von Schles. **3**: 458. 1888.

Plants terrestrial, mesopodous, gregarious, often confluent, small, cinnamon-brown with light margin; pileus subconvex to plane umbilicate or subinfundibuliform, irregular, thin, less than 1 mm. thick, 1.5–3 cm. wide; surface radiately fibrillose-striate, subpubescent, distinctly zonate with shades of brown, darker in the center, pink to nearly white toward the margin when fresh but turning more or less uniform brown when dried; substance darker and more compact than surface layer, azonate, thin; margin thin, acute, sterile; stem slender, subcylindrical, slightly bulbous at base with scarcely evident spongy tomentum, solid, pubescent, cinnamon-brown, 1–1.5 cm. long, 2–3 mm. wide; teeth slender, terete, acute, not decurrent, dark brown, less than 1.25 mm. long, shortening towards margin and stem; spores subglobose, coarsely tuberculate, 3–4 μ wide.

HAB.: On ground in dry woods. Dec.

RANGE: New York, *Peck;* Michigan, *Gray;* Alabama, *Earle, Baker.*

ICON.: Batsch, Elench. Fung. Contin. **2**: *pl. 40. f. 224 a, b.*

As these plants conform remarkably to Batsch's figures and appear to correspond in all respects with his descriptions, I believe them to be the true *H. zonatum* of Batsch. They are not, however, the plants more commonly referred to that species (*cf. H. concrescens*). The species is readily distinguished from other species even in the dried state. It is most closely related to *H. concrescens* from which it can be distinguished by its small size, thin pileus, slender stem, and lack of tomentum. The date given is only for the Alabama plant.

8. **Hydnellum floriforme** (Schaef.)

Hydnum floriforme Schaeffer, Fung. Bav. et Pal. 4 : 97. 1774.
Hydnum suberosum aurantiacum Batsch, Elench. Fung. Contin. 2 : 103. 1789.
Hydnum compactum Persoon, Comment. Schaef. 57. 1800.
Hydnum hybridum Persoon, *loc. cit.*
Hydnum aurantiacum Albertini & Schweinitz, Consp. Fung. 265. 1805.
Hydnum aurantinum Rafinesque-Schmalz, Prec. des Decour. 50. 1814.
Hydnellum aurantiacum Karsten, Medd. Soc. Faun. et Fl. Fenn. 5 : 27. 1879.
Calodon aurantiacus Karsten, Rev. Myc. 3[1] : 20. 1881.
Phaeodon aurantiacus Schroeter, Krypt. Fl. von Schlies. 3 : 459. 1888.

Plants terrestrial, mesopodous, somewhat gregarious, medium size; pileus somewhat round or irregular, convex, plane or depressed to subinfundibuliform, often complicated or compound, *i. e.*, consisting of several pileoli with short usually lateral stipes uniting into the common more or less central stipe, 4–11 cm. wide; surface subeven, sometimes uneven or colliculose, usually pubescent, pale brick-red, reddish-orange or dark brownish, lighter to cream-color at margin; margin thin, deflexed or obtuse, rounded, sometimes repand, sterile; substance an upper punky, pale brick-red, relatively thin layer, and a lower hard, woody, zonate, grayish-ochraceous to pale orange relatively thick layer extending into center of stem; stem central or excentric, occasionally lateral, more or less deformed, sometimes branched, usually bulbous below surrounded by a more or less compact subspongy mass, reddish yellow, pubescent, 1–3 cm. long, 0.5–2 cm. wide; teeth slender, terete, acute, decurrent umber to fuscus with light tips, sometimes deformed and coalescent, 4 mm. or less long; spores subglobose to ovoid, tuberculate, dark brown or fuscous, 4 by 4–5 μ wide.

HAB.: On the ground in dry woods. July–Oct.

RANGE: Connecticut, *Underwood;* New Jersey, *Ellis;* New York, *Underwood & Cook, Peck;* Alabama, *Earle & Baker.*

ICON.: Batsch, Elench. Fung. Contin. 2 : *pl. 40. f. 222;* Schaeffer, Fung. Bav. et Pal. Icon. *pl. 146.*

EXSICC.: Underwood and Cook, Century of Ill. Fung. 21.

The plants referred to the above species present a great variety

of forms so that it is very difficult to characterize the species satisfactorily, and still more difficult to distinguish it from its congeners. It possesses scarcely one invariable character that is not common to other species, still the compact woody character of the substance combined with its more or less orange tints will usually serve to distinguish the species. It has not been found possible to segregrate the many forms into any well-defined groups, and it seems necessary to regard the species as extremely variable in character. Moreover, single collections frequently show highly variable series of forms. This variable character has led to much confusion in nomenclature and in the broad view of the species taken in this paper most of the proposed species become reduced to synonymy. In fact the present treatment is practically a return to the limits set by Schaeffer.

Persoon first attempted to break up the Schaefferian group in his *Commentarius*, *loc. cit.*, dividing the species as figured by Schaeffer into two parts. Plate 146, figures 1, 2, 3, 5 and 6 he referred to *Hydnum compactum*, and plate 146, figure 4 with plate 147, figures 2–6 he referred to *H. hybridum* Bull. Later, in his *Mycologia Europeae* **2**: 166, he somewhat doubtfully returned to the Schaefferian conception but retained the name *H. compactum* for the whole aggregation. In the meantime the segregation inaugurated by Persoon had been adopted by others, notably by Fries who referred the second group of figures from Schaeffer to *H. aurantiacum* (Batsch) Alb. & Schw. but retained the first group under *H. compactum* Pers. The conception of the latter species appears to have undergone a gradual change until the name was employed to designate a very distinct plant from the species of Schaeffer. It is, therefore, evident that. *H compactum* Pers. should be treated as a synonym of *H. floriforme* Schaef. and the species now designated *H. compactum* Pers. by the European botanists doubtless should be renamed.

9. **Hydnellum conigenum** (Peck)

Hydnum conigenum Peck, Bull. Torrey Club **30**: 97. 1903.

Plants mesopodous, on cones, small; pileus obconic, subplane, even, somewhat round, 1–2 cm. wide; surface subpubescent, grayish-orange; margins sometimes split, thin, obtuse; substance com-

pact, fibrous, hard, azonate, orange-brown; stem slender, central or excentric, concolorous with pileus, bulbous at base with a compact mass of orange-colored spongy tomentum; teeth short, decurrent, whitish becoming brown; spores subglobose, colored, 4–5 μ wide.

Hab.: On fallen cones of pine. Autumn.

Range: Idaho, *Henderson.*

The type specimens are in the state herbarium at Albany. Only the one collection has been obtained and the above description has been drawn up largely from the original account of Peck. The species is closely related to *H. floriforme* (Schaef.) differing chiefly in its small size and peculiar habitat which is unusual in this genus.

10. **Hydnellum complicatum** sp. nov.

Plants terrestrial, mesopodous, complicated, medium size; pileus expanded, convex, depressed in center, subregular to irregular, lobed, and complicated, thin, rigid, 4–7 cm. wide; surface more or less uneven finely pubescent to subglabrous, cream-colored to reddish umber or purplish; margin thin, concolorous to reddish black, repand, sterile; substance fibrous compact, somewhat spongy, whitish to pale buff in upper part of pileus, harder, woody, subzonate in lower part and stem, becoming reddish toward the base; stem short, deformed, somewhat bulbous at base with a compact somewhat spongy covering, 2–3 cm. long, 1 cm. wide; teeth short, slender, terete, decurrent, cream-colored at margin to fuscous toward stem, 3 mm. long or less; spores subglobose to ovoid, finely tuberculate, fuscous, 3.5 by 4.5 μ wide; odor slight but agreeable. Sept.

Range: New York, *Van Hook 8191.*

The type specimens are in the herbarium of Cornell University, No 8191. The species is closely related to *H. floriforme* (Schaef.), differing chiefly in color, there being no tinge of yellow or orange, and in its smaller spores. The plant, though irregular and complicated, is more uniform and constant in its characters; the surface of the pileus as a rule is more even and smooth.

11. **Hydnellum Earlianum** sp. nov.

Plant terrestrial, pleuropodous or somewhat mesopodous, small; pileus expanded, convex to slightly depressed, roundish to dimidiate or reniform, 3–5 cm. wide; surface slightly uneven, somewhat colliculose, subpubescent to glabrous in places, brick red to brown

or blackish at margin, occasionally subzonate; margin thin, incurved, substerile, somewhat repand; stem slender, subcentral to excentric or lateral, inclined, somewhat spongy bulbous at base, brick red, pubescent, solid, 1–2 cm. long, 3–4 mm. wide; substance fibrous, tough-felty, brick red in upper part of pileus, more compact and darker below; teeth slender, terete, dark reddish-umber to blackish, decurrent, 2 mm. or less long, 0.15–0.20 mm. wide, about 3 to one millimeter; spores subglobose, tuberculate, 3.5–4 μ wide.

HAB.: On earth in woods. Aug.

RANGE: South Carolina, *Ravenel;* Georgia, *Underwood.*

EXSICC.: Ravenel, Fung. Car. Exsicc. **3**: 17, as *Hydnum ferrugineum* Fries.

The type specimen is in the Underwood Herbarium, No 411, from Tallulah Falls, Ga. A part of the same collection is also in the herbarium of the New York Botanical Garden with the same number. The Ravenel specimens were distributed in his exsiccati as *Hydnum ferrugineum* Fries, but the plants are very distinct from that species in nearly every feature. The species is distinctly marked by its peculiar brick red color and its more or less dimidiate pileus. I take pleasure in dedicating this species to Professor Earle, whose excellent field notes have frequently aided in the discrimination of species in this family.

12. **Hydnellum humidum** (Banker)

Hydnum humidum Banker; White, Bull. Torrey Club, **29**: 553 1902.

Plants terrestrial, mesopodous, rather large; pileus irregular, lobed, and convolute, depressed, scrobiculate, often cracked more or less radiately, 5–8 cm. wide; surface minutely pubescent, yellowish, becoming light yellowish brown; margin obtuse sterile; substance spongy to corky, exuding water when pressed, becoming hard, compact, brittle when dried, faintly zonate, grayish to yellowish brown; stem short, deformed, brownish, stout, 1–4 cm. long, 1–1.5 cm. wide; teeth slender, terete, acute, dark brown with light tips, decurrent, distributed irregularly 3–6 to one millimeter, 5 mm. or less long, 0.1–0.2 mm. wide; spores subglobose to ovoid, irregular, tuberculate, brownish, 3.7–4.5 μ by 4.5–5.5 μ; taste mild; odor strong, but not unpleasant.

HAB.: On ground in damp woods. Sept.–Oct.

RANGE: Maine, *White;* New Jersey, *Ellis.*

The type specimen was collected in Maine and is now in the herbarium of the New York Botanical Garden but is badly injured by mould. The New Jersey specimens also in the New York Botanical Garden appear to be identical in every respect and are in good condition. The original description is here supplemented by a study of these. The plants were referred by M. C. Cooke to *Hydnum compactum* Fries but I cannot see that they have any relation to that species, and certainly they do not in the least resemble European specimens referred to *H. compactum*. The field notes on the type specimen state that the teeth were 5 mm. long, but in all the dried specimens they are notably short, not over 2 mm. long.

13. Hydnellum suaveolens (Scop.) Karst. Medd. Soc. Faun. et Fl. Fenn. 5 : 27. 1879

Hydnum suaveolens Scopoli, Fl. Carn. 2 : 472. 1772.

Hydnum boreale Banker; White, Bull. Torrey Club, 29 : 553. 1902.

Calodon suaveolens Karsten, Rev. Myc. 3[1] : 20. 1881.

Plant terrestrial, mesopodous, solitary, large; pileus obconical convex to plane, depressed at center, somewhat round, 7–15 cm. wide; surface woolly pubescent subeven to uneven, white becoming dirty greenish; margin thick, obtuse; substance spongy, soft, whitish in the upper part of the pileus, hard, compact in the lower portion, zonate with whitish and deep lavender or bluish bands; stem short, almost wanting, compressed; teeth short, terete, obtuse, or acute, decurrent, brownish with white tips, 5 mm. long, 0.5 mm. wide; mycelium purple, persistent; odor unpleasant.

Hab.: On ground in leaf mould under balsam.

Range: Canada, *Saunders;* Maine, *White, Churchill.*

Icon.: Harzer, Naturg. Abb. Pilze, *pl. 52;* Quélet, Les Champ. du Jura et des Vosg., *pl. 20. f. 1.*

Exsicc.: Linhart, Fung. Hung. 346; De Thümen, Fung. Aust. 919.

The plant described as *Hydnum boreale* Banker, *loc. cit.*, is probably an unusually large and abnormal form of *H. suaveolens* and I have therefore reduced it to synonymy. The Churchill and Saunders specimens which are in the state herbarium at Albany are apparently typical plants and conform in all respects to the specimens

of the European exsiccati. The icones cited represent our plant fairly well except that they all show too intense a blue color, but the color may have faded greatly in drying. It has not been my fortune to see the living plant. I have not been able to secure entirely satisfactory spore characters from the American specimens. Apparently the spores are pale in color, oblong, angular, and somewhat tuberculate. The plant appears to be distinctly northern in its distribution.

14. **Hydnellum cyaneotinctum** (Peck)

Hydnum cyaneotinctum Peck, Bull. Torrey Club, 30 : 98. 1903.

Plant terrestrial, mesopodous, light colored, medium size; pileus obconic, depressed to convex, somewhat round to irregular, 3–9 cm. wide, 2–10 mm. thick; surface subeven to uneven, sometimes somewhat colliculose, woolly pubescent to subfloccose, drab to isabelline becoming bluish toward the margin, fading to pale-blue or disappearing in drying, azonate; margin thick, rounded, sterile, becoming brown to black where rubbed; substance spongy tomentose in upper part of pileus, compact, hard, and woody below and in stem, more or less transversely zonate, often tinged with blue; stem usually central, sometimes lateral, vertical, subterete, attenuate downward, but surrounded below by a bulbous mass of spongy tomentum that reaches nearly to the pileus and makes the stem appear deformed outwardly, surface brownish, about 1 cm. long by 7–10 mm. wide, bulbous base about 1.5 cm. wide; teeth slender, terete, acute, shortening uniformly toward stem and margin, umber at base becoming lighter toward tip, 4–0 mm. long, 0.25 mm. wide near base to 0.09 mm. wide at tip, decurrent to bulbous base; spores oblong, coarsely tuberculate, often uniguttulate, "purplish brown in spore print," about 4 by 7 μ wide; basidia clavate, four-spored, sterigmata about 3.5 μ long; odor farinaceous, not strong.

HAB.: On ground under Hemlock. July–Sept.

RANGE: Maine, *Anderson;* New York, *Peck.*

The plant resembles in structure and consistency *H. velutinum* and *H. suaveolens*, differing from the former chiefly in color, and from the latter both in color and odor.

The type specimens were from Orris Island, Me. The New York specimens were found by Peck himself in Warren County, and sent to the writer. They correspond in all respects to the

original description, except I observe the spores to be distinctly oblong, whereas Dr. Peck says "globose 4 μ wide."

7. PHELLODON Karst. Rev. Myc. 3[1]: 19. 1881

Plants chiefly terrestrial, mesopodous, often deformed, usually light colored, whitish, grayish or buff, sometimes dark; substance fibrous, tough, often thin, fragile when dry, sometimes in two layers, the outer felty, soft, the inner hard, compact; spores white or hyaline, usually echinulate.

The genus as here defined is closely related to *Hydnellum* and perhaps all the forms should be included in the one genus as was at first intended in this paper, but the spore characters are so distinct and constant that it seems desirable to recognize these species as constituting a closely related genus.

Under low powers of the microscope the spores frequently appear to be smooth but with high powers I have always found them roughened with exceedingly fine points. In *Hydnellum* the roughening of the spores is coarse enough to be detected with low powers of the microscope and appears as rounded protuberances often so large as to cause the spore to appear irregular in outline. While high powers of the microscope are often necessary to determine the character of the roughening and sometimes even that the spores are rough in this genus, the tough substance combined with the white spores is usually sufficient to separate it from others closely allied.

Synopsis of the Species

Substance of pileus in two distinct layers, the upper soft felty, and the lower more compact, darker; plants usually with odor.

Compact part of substance and core of stem blackish.

Surface of pileus floccose-tomentose, subzonate, depressed. 1. *P. niger.*

Surface of pileus pubescent to villose, azonate, convex, rarely depressed. 2. *P. alboniger.*

Compact part of substance and core of stem, grayish or light colored.

Surface of pileus brown to blackish brown, with a white margin; odor strong when fresh, milder when dry. 5. *P. putidus.*

Surface of pileus grayish fuscous to smoky, rarely ochraceous; odor developed in drying.

Pileus-woolly-pubescent, irregular, subsessile, forming crust-like masses. 3. *P. vellereus.*

Pileus subpubescent to glabrous, subregular; stem slender. 4. *P. graveolens.*

Substance of pileus nearly uniform, thin.
Surface of pileus more or less zonate.
Zonations alternately light and dark, raised. 6. *P. fasciatus.*
Zonations shading regularly to the margin.
Plants more than 1 cm. wide, color reddish brown or chestnut.
Plants 1–3 cm. wide, confluent, odorless.
7. *P. tomentosus.*
Plants more than 3 cm. wide, rarely confluent, fragrant.
8. *P. coriaceo-membranaceus.*
Plants small, less than 1.5 cm. wide, coloray-brown or mouse-colored.
9.gr. *P. Ellisianus*
Surface of pileus azonate ; substance soft, cottony. 10. *P. delicatus.*

1. PHELLODON NIGER (Fries) Karst. Rev. Myc. 3[1]: 19. 1881
Hydnum nigrum Fries, Obs. Myc. 1 : 134. 1815.
Hydnellum nigrum Karsten, Medd. Soc. Faun. et Fl. Fenn. 5 : 27. 1879.
Calodon niger Quélet, Ench. Fung. 191. 1886.

Plant terrestrial, mesopodous, medium size ; pileus expanded, depressed, subround to irregular, uneven, 2–5 cm. wide ; surface floccose-tomentose toward center, radiate-fibrose toward margin, subzonate, blackish to olivaceous when fresh, mouse-gray to fuscous when dry ; margin thin, acute, sterile ; substance spongy or pithy, fuscous in upper part of pileus, compact, hard, bluish black in lower part and continuous as a core in the stem ; stem slender, deformed, surrounded below by spongy tomentum, surface floccose-tomentose, fuscous 6 cm. long, 1.5 cm. wide ; teeth slender, terete, or flattened and coalescent toward the margin, often forming concentric lamellae, subpuberulent, scarcely decurrent, whitish, at length cinereous ; spores globose, echinulate, white, 4–5 μ wide ; taste mild, odor faint in the dried plant.

HAB. : On ground among leaves. Aug.

RANGE : Connecticut, *Underwood, Earle ;* New York, *Peck.*

ICON. : Fries, Icon. Select. Hym. 1 : *pl. 5. f. 2.*

EXSICC. : Karsten, Finland Fung. 908 ; Sydow, Myc. March, 3334 ; Allescher & Schnabl, Fung. Bavar. 132 ; Roumeguere, Fung. Select. Exsicc. 4309.

These plants differ from Fries' description in that they have a faint odor when dried, are subzonate, not of one color within, and Fries does not mention two kinds of substance to the pileus. His figure in the *Icones*, however, represents a plant subzonate and is a good representation of our plant in all particulars except that

the stem is too stout. The European exsiccati also contain typical examples of the American plant, except that Roumeguere 4309 appears to be more delicate than our plant.

2. **Phellodon alboniger** (Peck)

Hydnum albonigrum Peck, Rept. N. Y. State Mus. Nat. Hist. 50: 110. 1897.

Plant terrestrial, mesopodous, gregarious, confluent, small size; pileus obconical, subconvex, expanded, or slightly depressed subround to irregular, somewhat uneven, 1–7 cm. wide; surface covered with a whitish pubescence, sometimes subglabrous, cinereous to fuscous or mouse-colored, blackish where handled, azonate; margin thin, obtuse, sterile; substance spongy tomentose in upper part of pileus, compact, hard when dry, fibrous, bluish-black in lower part and continuous as a core to the stem, very hygrophanous so the water can be squeezed out in drops, juice clear watery; stem short, slender or stout, surrounded below by a large mass of spongy tomentum often as large or larger than the pileus, solid hard and black within, surface fuscous or mouse-colored, pubescent, 1–2 cm. long, 0.5–1 cm. wide; teeth slender, terete, decurrent, whitish or cinereous, becoming black where injured, 2 mm. or less long, longest toward stem; spores subglobose, echinulate, white, 3.5–4 μ wide; odor of fresh plant not noticeable, becoming strong in drying.

Hab.: Growing in wet ground in woods. July–Aug.

Range: (A). Maine, *White;* Massachusetts, *Vail;* Connecticut, *Underwood;* New York, *Peck, Banker, Earle;* Pennsylvania, *Schweinitz;* Tennessee, *Murrill.*

(B) Connecticut, *Underwood:* New York, *Underwood;* New Jersey, *Ellis;* Delaware, *Commons;* Kentucky, *Morgan.*

Exsicc.: Ellis, North. Am. Fung. 710, as *Hydnum graveolens.* The type specimen is in the N. Y. State Herbarium at Albany. The species is closely related to *P. niger* (Fries) Karst but differs in its lighter superficial color, its whitish tomentum, the less depressed pileus, the surface of the pileus not shaggy floccose but only pubescent or tomentose, and in the larger mass of tomentum about the base. In old specimens the spongy tomentum of the cap seems to break up and fall away exposing the hard dark underlayer which often appears when thus exposed zonate, the adhering pieces of the old tomentum giving the surface a scrobic-

ulate character. Such is the appearance of the plant in the Schweinitz Herbarium which he referred to *H. compactum* Pers. A collection from West Park, N. Y., shows plants faintly zonate and with some of the teeth flattened and coalescent forming pseudopores, perhaps a form approaching *P. niger*.

The collections quoted under (B) above show plants of fairly constant characters differing from the typical specimens of the first list in a somewhat taller habit of growth, the hard interior not quite so dark, and the pileus buff or isabelline. Whether these represent a distinct species or variety is, however, doubtful, and can be decided only by more complete field study. Possibly they represent older states of the plant. The specimen examined in Ellis, N. Am. Fung. 710 issued as *Hydnum graveolens* Fries was of this type but does not appear to me to answer at all to Fries' description or figure. Most of the plants of this latter type have been referred to *H. suaveolens* Scop. but this disposition of them seems to be as unsatisfactory as the former and in both cases the odor appears to be the determining factor of the diagnosis.

The odor is very marked when the plants are drying and persists for a long time afterward, but does not seem to be so permanent as in *P. vellereus*. It is described by several authors as the odor of melilot, but to me it is more like that of bone-meal.

3. **Phellodon vellereus** (Peck)

Hydnum vellereum Peck, Rept. N. Y. State Mus. Nat. Hist. **50**: 110. 1897.

Plant terrestrial, mesopodous or submesopodous, confluent, often forming crust-like masses among the dead leaves, cream-colored to ash-gray, sometimes brownish; pileus expanded, subobconic, irregular, lobed, depressed, often confluent, 2.5–10 cm. wide; surface woolly-pubescent or densely subtomentose, very uneven or colliculose, grayish white or brownish with the pubescence whitish, sometimes the whole cream-colored, lighter at margin, azonate; margin thick, obtuse, sterile, whitish or cream-colored; substance fibrous, tough, rather soft above, more compact below and in the center of the stem, grayish above to light brown in the compact portion, subzonate, dry; stem short, deformed, often surrounded below by an irregular mass of spongy tomentum concolorous with the pileus, 1.5–2 cm. long, 0.5–1.5 cm. wide; teeth short, slender, terete, acute, shortening to the sterile margin, decurrent, whitish

to ash-gray, lighter at the tips, 1.5 mm. or less long, 0.3 mm. wide at the base; spores subglobose, echinulate, white, about 3.5 μ wide; taste mild, odor in drying very fragrant, resembling slippery elm, and persistent in the dried plants for years.

Hab.: Among fallen leaves in mixed woods. Aug.

Range: Connecticut, *Earle 1080, White, Underwood;* New York, *Peck, Banker.*

The type plant is in the N. Y. State Herbarium at Albany. The species is near *P. graveolens* (Delast.), from which it may be distinguished by its subsessile habit and its thickened woolly pubescent pileus. From *P. alboniger* (Peck), some forms of which it also resembles, it may be distinguished by its brownish not blackish substance, and by its dry not hygrophanous character.

4. **Phellodon graveolens** (Delast.)

Hydnum graveolens Delastre; Fries, Epic. 509. 1836–38.

Plant terrestrial, mesopodous, gregarious, medium size; pileus thin, expanded, depressed, nearly round, 2–6 cm. wide; surface somewhat uneven, subcolliculose at center, subpubescent to glabrous, azonate, smoky with fuscous blotches toward center, creamy-white at margin, margin incurved, sterile, subrepand; substance soft spongy at top of pileus, more compact below and in the center of stem, smoky; stem short, subcentral, somewhat deformed, not bulbous, fuscous, pubescent, 2 cm. long, 0.8 cm. wide; teeth short, creamy-white to ash-gray, subdecurrent, less than 1 mm. long; spores subglobose, echinulate, white, 3.5 μ wide; odor fragrant.

Hab.: On ground in woods. Sept.

Range: Connecticut, *Underwood;* New York, *Van Hook, Shear;* New Jersey, *Ellis.*

Icon.: Fries, Icon. Select. Hym. *pl. 6. f. 1.*

This species has given me more trouble than any other in the family. The above description is drawn up from dried plants which appear to have the essential characters of Delastre's plant and conform best to Fries' figure. These forms are of constant and uniform character as shown in the above distribution, but in the collections they are more or less mixed up with other very different appearing plants. It is surprising to see the great variety in the forms that have been referred to this species. Apparently everything with a strong odor has been referred to *Hydnum graveolens* Delast., a practice which seems to have had its origin in Cooke's

determinations, if we may judge by the following comments made by him on a specimen much resembling *H. Carbunculus* (Secr.). "This is undoubtedly the American representative of our European *Hydnum graveolens* Delast. and we have but one species of that name. It has the same odor. The only strong scented one besides is *H. suaveolens* which is blue internally. I agree with you it is not like Fries' figure nor like our specimens," etc.

While under this name in the collections there are many very distinct forms which doubtless represent well-marked species they are in such confusion that it is impossible to separate them satisfactorily. Determinations by Bresadola, Patouillard, and others do not agree even with respect to the same plants. Careful discriminating field work on these forms will I am confident result in the separation of several distinct species. It is important as a basis of this work, however, that *P. graveolens* (Delast.) should be clearly defined.

5. **Phellodon putidus** (Atkin.)

Hydnum putidum Atkinson, Mushr. Edib., Pois., etc., 199. 1900.

Plant terrestrial, mesopodous, irregular, large, brown with broad white margin; pileus broad, depressed or subinfundibuliform, irregular, lobed, 8–12 cm. wide; surface uneven, at first subtomentose or pubescent becoming smooth, subzonate, brown to blackish-brown toward center, white to cream-colored toward margin; margin thick, obtuse, sterile; substance spongy whitish in upper part of pileus, tough, more compact but not very hard, darker in lower part, whole plant light and pithy when dry, pliant when moist; stem stout, irregular or deformed, surrounded by a thick spongy tomentum; teeth long, slender, terete, acute decurrent, at first white or cream-colored changing, through salmon or directly, to grayish-brown, 4 mm. or less long; spores globose, echinulate, white, 3–4 μ wide; odor fetid when fresh disappearing in drying.

Hab.: On ground in woods. Aug.–Sept.

Range: North Carolina, *Atkinson.*

Icon.: Atkinson, *loc. cit.* 1st. ed. *pl. 69; Idem*, 2d. ed. *pl. 79.*

The type plants collected at Blowing Rock, N. C., are in Cornell University Herbarium No. 4334. These are the only specimens I have seen of this species, which is well marked and clearly defined. The above description is drawn up largely from Atkin-

son's original account supplemented by a reëxamination of the type which was generously loaned me for the purpose. Professor Atkinson describes the odor when fresh as that "of a perspiring darkey."

6. **Phellodon fasciatus** (Peck)

Hydnum fasciatum Peck, Rept. N. Y. State Mus. Nat. Hist. **41**: 78. 1888.

Plants terrestrial, mesopodous, gregarious, sometimes confluent, small, zonate; pileus thin, spreading nearly plane, umbilicate, almost round, 1.5–3 cm. wide; surface "blackish brown with several narrow, elevated, scabrous, tawny-gray, concentric zones"; substance fibrous, tough, thin; stem short, slender, tough, tawny gray or blackish, 1–1.5 cm. long, 2–3 mm. wide; teeth short, decurrent, ferruginous-brown; spores subglobose, tuberculate, about 4 μ wide.

Hab.: On ground in woods. Sept.

Range: New York, *Peck*.

The type specimens are in the New York State Herbarium at Albany. The original collection made in the Catskills is the only one known, although the plants are clearly marked and not inconspicuous. It would appear to be a rare species. The species is evidently closely related to *P. tomentosus* (L.) but is clearly distinguished from that species by its peculiar sharply defined zonations and its darker color.

7. **Phellodon tomentosus** (L.)

Hydnum tomentosum L. Sp. Pl. **2**: 1178. 1753. Not *H. tomentosum* Schrader, Spic. Fl. Germ. 177. 1794.

Hydnum cyathiforme Schaeffer, Fung. Bav. et Pal. **4**: 93. 1763. Not *H. cyathiforme* Bulliard, Hist. des Champ. de la France, 308. 1791.

Hydnellum cyathiforme Karsten, Medd. Soc. Faun. et Fl. Fenn. **5**: 27. 1879.

Phellodon cyathiformis Karsten, Rev. Myc. **3**[1]: 19. 1881.

Calodon cyathiformis Quélet, Ench. Fung. 191. 1886.

Plant terrestrial, mesopodous, gregarious, confluent, small, zonate; pileus plane to depressed, occasionally subinfundibuliform, nearly round, 1–2 cm. wide, often confluent into crust-like layers, sometimes several decimeters wide; surface radiately fibrous-striate,

floccose-tomentose or subscrobiculate at the center of the disk, subsulcate-zonate, castaneous or darker near center to light cream-color or whitish at margin; margin thin, substerile; substance fibrous tough, thin; stem slender, terete, attenuate downward to a common floccose-tomentose base imbedded in the substratum, subpubescent, cream-colored above to glabrous dark reddish brown below, 1–1.5 cm. long, 2–7 mm. wide; teeth slender terete, acute, scarcely decurrent, whitish to cream-colored, 2 mm. long and less; spores subglobose, echinulate, white or hyaline, 3.5–4 μ wide.

HAB.: On ground among moss. Aug.–Nov.

RANGE: Maine, *MacDougal;* New Hampshire, *Minns;* Connecticut, *Underwood;* New Jersey, *Ellis.*

ICON.: Schaeffer, *op. cit., pl. 139;* Harzer, Naturg. Abb. Pilze, *pl. 3. f. 1–5.*

EXSICC.: Krieger, Fung. Sax., 906; Roumeguere, Fung. Gall., 2306; Sydow, Myc. March., 206 and 1011; DeThumen, Myc. Univ., 207; Rabenhorst, Fung. Eur., 611 and 2304; Herpell, Samml. präp. Hutp., 115; Ellis, N. Am. Fung., 927.

The species resembles in many respects *Hydnellum zonatum* (Batsch) but is clearly distinct in color and especially widely separated by its spore characters.

There has been some doubt among mycologists as to the identity of *H. tomentosum* L. In fact from the two-line description in the *Species Plantarum* it is not possible to decide what species the name represents, but in Fl. Suec. 383, the description seems clearly to indicate the above plant.

8. **Phellodon coriaceo-membranaceus** (Schw.)

Hydnum coriaceo-membranaceum Schweinitz, Syn. N. Am. Fung. 162. 1834.

Hydnum graveolens subzonatum Peck, Bull. N. Y. State Mus. Nat. Hist. **75**: 24. 1904.

Plant terrestrial, mesopodous, gregarious, more or less confluent, medium size, zonate; pileus subplane, depressed or occasionally in small forms infundibuliform, nearly round or somewhat irregular, 3–5 cm. wide; surface radiately striate, subsulcate-zonate, dark brown at center growing lighter by zones to cream-colored margin; margin thin, sterile, more or less lacerated; substance fibrous, tough, brittle when dry, thin, 1–2 mm. thick; stem slender, terete, attenuate downward, dark brown to nearly black at base,

becoming lighter upward, rugose, central, 2–3 cm. long, 3–5 mm. wide; teeth slender terete, tapering, acute, flexuose, cream-colored, 1.5–2 mm. long becoming shorter to the sterile margin, not decurrent; spores subglobose, echinulate, white, 3.5 μ wide; odor strong, heavy, resembling that of *P. alboniger* (Peck) and very persistent in the dried plant.

Hab.: On ground among moss. Sept.

Range: New Brunswick, *Bertolet*; New York, *Peck*.

This species is almost an exact duplicate of *P. tomentosus* (L.) as recognized in this paper in most of its characters and perhaps should be regarded only as a variety of that species. Its larger size and especially its pronounced odor seem to warrant its recognition as a distinct species. I have never detected any odor in the smaller plant while the plants referred here retain the strong odor even after many months.

The type specimen in the Schweinitz Herbarium is wholly destroyed and the above determination is based entirely on his description, with which these plants appear to answer in every particular. Schweinitz does not make mention of an odor. This omission can not be regarded as too important since tastes and odors were often unnoticed by the older mycologists. The size which he attributes to his plants would seem to preclude their being *P. tomentosus* (L.). It is very doubtful, however, if he would have made any distinction between the two species. As his description applies so well to the plants here under discussion and as it can not be shown that it pertains to any other forms I feel justified in retaining Schweinitz's name for the above species.

9. **Phellodon delicatus** (Schw.)

Hydnum delicatum Schweinitz, Syn. N. Am. Fung. 161. 1834.

Not *H. delicatum* Klotsch. Ann. Nat. Hist. **3**: 395. 1839.

Plant terrestrial, mesopodous, gregarious, sometimes confluent, small; pileus nearly round to flabelliform, expanded, depressed to subinfundibuliform, 1–2 cm. wide; surface even, pubescent, azonate, grayish-white to light brown; margin paler, sterile; substance thin, soft, cottony throughout, hymenial surface arachnoid, concolorous; stem very slender, subcentral to lateral, attenuate downward to an abrupt bulbous base, solid, 1 cm. long, about 1 mm. wide; teeth short, stout, subconical, subdecurrent, cream-colored to cinereous, 1.5 mm. long and less; spores globose, hyaline, echinulate, 3–3.5 μ wide.

HAB.: On ground under logs. Oct.–Nov.

RANGE: New Jersey, *Ellis;* Pennsylvania, *Schweinitz.*

The type specimen is in the Schweinitz Herbarium in the Philadelphia Academy of Science, and though somewhat fragmentary shows many characters of the plant. The only essential difference between the Schweinitz and Ellis plants is in the color. The former is nearly a tan color and the latter is grayish brown, but Schweinitz in his description says " cinereo gilvo."

The above description is drawn from the dried specimens, as it has not been my privilege to see the living plants or to receive any field notes upon the species. It is a very delicate little species and appropriately named. I know of nothing with which it appears to be very closely related.

10. **Phellodon Ellisianus** sp. nov.

Plant terrestrial, mesopodous, gregarious, slightly confluent, small; pileus nearly round, umbilicate to infundibuliform; 0.7–1.5 cm. wide; surface even, radiately fibrous-striate, subzonate, nearly smooth, mouse-colored to fuscous with whitish marginal band; margin thin, even, sterile, whitish; substance fibrous, subcompact, thin; stem slender, terete, central, attenuate downward to a bulbous tomentose base, cinereous above to mouse-colored below, 4–7 mm. long, 1–2 mm. wide; teeth relatively coarse, short, subdecurrent, cinereous, 1 mm. long and less, 0.12 mm. wide, 3 and 4 to one millimeter; spores globose, echinulate, white, 3.5 μ wide.

HAB.: On the ground in wood-road. Oct.

RANGE: New Jersey, *Ellis.*

The type specimens are in the Herbarium of the New York Botanical Garden. The species in some of its characters comes near *P. delicatus* (Schw.) but differs in color, its more compact and firmer texture of the substance, its more regular form of pileus, and its deep central depression. In size also it averages somewhat smaller. It is a most beautiful and delicate little species, likely to be overlooked on account of its size and color. The only specimens known are those collected by J. B. Ellis to whom I take pleasure in dedicating this species.

SPECIES DUBIA ET INQUIRENDA

Hydnum confluens Peck, Rep. N. Y. State Mus. Nat. Hist. **26**: 71. 1874. The type specimen in the N. Y. State Herbarium at

Albany resembles very much the forms here referred to *P. niger*, but is distinctly marked by a peculiar ring of spongy tomentum about the stem a little below the cap. This feature, however, is so unusual that I am inclined to regard it as a freak until other plants are found showing it to be a true specific character.

8. **LEAIA** gen. nov.

Plants pileate or resupinate, epixylous, dark to light umber or grayish, subiculum of branched processes clothed above with a dense shaggy coat of coarse tomentum; teeth slender, terete, acute; spores minutely papillose, elliptical, guttulate, hyaline or white.

This genus is unique among the Hydnaceae. It is difficult to say where it is most nearly related, for it does not appear to have any very near relation to any other genus of the family. It has some characters of *Hydnellum* and in some respects suggests connection with *Auriscalpium*. The spore characters especially suggest the latter relationship. The branched processes, which are its most fundamental peculiarity, are suggestive at first thought of *Hericium* but the dark color, tough fibrous substance, and papillose spores at once separate it from that genus. The character of the branched processes also is entirely different and though difficult to describe, are readily recognized when once seen. This branching of the plant body also readily separates the genus from either *Hydnellum* or *Auriscalpium*.

It seems most appropriate that this well-marked genus should be dedicated to the memory of that pioneer mycologist of the Ohio Valley, Mr. T. G. Lea, who first detected one of its species.

Synopsis of the Species

Plant pileate, dimidiate; ends of branches flattened.	1. *L. piperata*.
Plant wholly resupinate; ends of branches subterete.	2. *L. stratosa*.

1. **Leaia piperata** sp. nov.

Plant sessile, subdimidiate to flabelliform, caespitose, subimbricate, laterally confluent to 8 or 10 cm. wide; the pilei ascending toward the margin, 0.5–4 cm. wide, 1–3 cm. long, less than 0.5 cm. thick excluding the teeth; the body of the plant composed of repeatedly branching but not anastomosing processes, tough, fibrous, flexible, umber, clothed above with a dense tomentum of brownish strigose hairs, the lower branches horizontal, with the

teeth pendent from their lower sides, ending at the margin in vertically-compressed naked free ends which are paler and subtranslucent, the upper branches ascending and terminating on the surface of the pileus in terete free ends wholly surrounded with strigose branched hairs but with the tip naked, paler, subtranslucent, the projecting ends standing up like miniature spruce trees, the naked ends becoming blackish in old weathered specimens and in drying ; margin fimbriate from the projecting ends of the branches ; teeth slender, terete, acute, shortening toward the margin, 3 mm. long and less, 0.14–0.18 mm. wide, 2 or 3 to one millimeter, dark umber to pale brown toward the margin, in composition and color like the branched processes ; spores ovoid or elliptical, hyaline, with one or more irregular guttulae, minutely papillose, 3.5–4 μ by 4.5–5 μ ; sterigmata 3–3.5 μ long ; basidia four spored, clavate ; taste intensely acrid ; odor not marked.

HAB. : On very rotten stump in damp woods. June–Aug.

RANGE : New York, *Ellis*, *Banker ;* Nebraska, *Webber ;* Iowa, *Holway.*

The type material is in the author's collection preserved both dry and in formalin, the latter method seeming to preserve all the characters of the plant perfectly. Material obtained a year later from the same stump is in the New York State Herbarium at Albany. This species is the type of the genus.

The plant was first found by Ellis in Potsdam, N. Y., in 1855 and was sent for determination to Ravenel, whose reply was "new and very curious." No attempt, apparently, was made to describe or publish the species and it was soon buried in the mass of the Ellis collections. In the spring of 1904 the writer noticed the specimen, small and somewhat the worse for age, in the collection at New York and took notes on it. That very summer it was his fortune to find a considerable quantity of the same thing on a stump in Schaghticoke, N. Y., and it was from this material that the above description has been prepared.

The Webber and Holway specimens differ from the type plants in the pileus being plane with the surface nearly even. Apparently the ends of the branches do not project and form a roughened surface as in the type forms. It is doubtful, however, if they represent a fixed variation. These plants were referred by Ellis first to *Hydnum cirrhatum* Pers. and afterwards to *Hydnum strigosum* Swartz, but the character of the subiculum shows them to be distinct from either.

2. Leaia stratosa (Berk.)

Hydnum stratosum Berkeley, Lond. Jour. Bot. 4: 307. 1845.

Plant wholly resupinate on the under side of logs, frequently stratose from successive growths, spreading 2–10 cm.; subiculum thin, 1–2 mm., consisting of fine repeatedly branched processes not anastomosing, with free subterete ends at the margin, clothed above, that is, between the branches and the substratum, with a varying thickness of a woolly umber tomentum; substance of the subiculum tough, fibrous, brownish; margin irregular, lobed, fimbriate from the projecting ends of the branches, subfertile; teeth slender, terete, tapering, acute, subflexuose, pendent from the branches concolorous and similar in substance, at length hoary from the spores, 1–2.5 mm. long, 0.2–0.3 mm. wide; spores globose to subovoid, white or hyaline, one or more guttulate, minutely papillose, 4–7 μ wide.

HAB.: On rotting logs. April–Sept.

RANGE: New York, *Underwood;* Indiana, *Underwood;* Ohio, *Lea.*

The type plant collected by T. G. Lea in Ohio is in the Kew Herbarium, England. Through the kindness of Dr. L. M. Underwood comparison of our plants with the type was effected, and there can be no doubt as to their identity. The above description is drawn up from the dried specimens. We have not seen the fresh plant and the taste is not known.

The plant is remarkable not only for its unique character, but also for the fact that in a period of over fifty years only one collector besides its discoverer has ever found it, although it would seem to have considerable range of distribution. So keen an observer and diligent a collector in the type region as A. P. Morgan became very sceptical concerning it, remarking: "There is no record of its ever having been found again, and Mr. Berkeley does not enumerate it in the notices of North American Fungi. I have never met with anything that would answer to it in any way." * It is evident that the plant is rare, as is also its congener, here published for the first time.

9. AURISCALPIUM S. F. Gray, Nat. Arr. Brit. Pl. 1: 650. 1821

Plant pileate, pleuropodous, hirsute; pileus with a sinus through which the slender cylindrical stem passes; substance tough, flexi-

* Jour. Cin. Soc. Nat. Hist. 10: 9.

ble; teeth slender, terete, tapering; spores ovoid, white, more or less guttulate, minutely papillose.

The genus is monotypic. In color, consistency and spore characters it shows considerable affinity with *Leaia*, but shows no indication whatever of the branching peculiar to that genus.

1. AURISCALPIUM AURISCALPIUM (L.) S. F. Gray, Nat. Arr. Brit. Pl. **1**: 650. 1821

Hydnum Auriscalpium L. Sp. Pl. **2**: 1178. 1753.

Auriscalpium vulgare Karsten, Medd. Soc. Faun. et Fl. Fenn. **5**: 27. 1879.

Pleurodon Auriscalpium Karsten, Rev. Myc. 3^1: 20. 1881.

Leptodon Auriscalpium Quélet, Ench. Fung. 192. 1886.

Plants small, pleuropodous, dark brown, 1–6 cm. high; pileus, horizontal, subcordate to reniform, convex to subplane, 0.5–2.5 cm. wide; surface hirsute or subglabrous in age, brown to blackish; margin strigose, hairy, fimbriate, fertile; stem vertical, slender, terete, solid, bulbous at base, attenuate upward and passing through the sinus of the pileus bends over adnate to the upper surface as a ridge to near the center, hirsute-tomentose, spongy at base, dark brown, darker than pileus, 1–6 cm. long, 1–3 mm. wide; substance tough, flexible, light brown; teeth slender, terete, tapering, acute, light brown to grayish-white from the spores, 0.5–2 mm. long, 0.10–0.15 mm. wide, not decurrent; spores ovoid to subglobose, minutely papillose, often guttulate, white or hyaline, 4.5 by 5–6 μ.

HAB.: On decaying cones of conifers. June–Nov.

RANGE: Maine, *Ricker;* Massachusetts, *Clark;* Minnesota, *Holway:* Iowa, *Macbride;* Arizona, *Griffiths & Thornber;* Oregon, *Sweetser.*

EXSICC.: M. C. Cooke, Fung. Brit., 306; Desmazières, Pl. Crypt de Fr., 954; De Thumen, Myc. Univ., 1106; Rabenhorst, Fung. Europ., 17; Roumeguère, Fung. Select., 6935; Ellis & Everhart, Fung. Columb. Cont. by C. L. Shear, 1408; Cavara, Fung. Longob., 106; Mougeot & Nestler, Stirp. Crypt. Vog. Rhen., 777; Ellis & Everhart, N. Am. Fung. 2d. Ser., 2511.

The species is also European and through all its widespread distribution maintains a remarkable constancy of character and is one of the most readily recognized species in the family.

In one set of Desmazieres Pl. Crypt. de France 954 the specimens showed normal plants apparently growing from the stipe of an-

other plant, as though the plant might be sometimes proliferous on itself. In the fall of 1901 I received from Prof. Sweetser, Forest Grove, Oregon, some fresh plants of *A. Auriscalpium* packed in damp moss and enclosed in a tight can. A few days after they were received what appeared to be new growths were observed starting out from the base of the stipe. In several cases they were observed later to start from the upper part of the stipe also and even from the pileus. The material was placed in a damp chamber where the growth was maintained from Dec. 7 to Jan. 25. During this time a number of the growths developed, becoming slender subterete stipe-like bodies, more or less hirsute, with conical-pointed naked tips, 1–5 cm. long and 1–4 mm. wide, brownish toward the base, becoming pale toward the naked tips, covered with strigose hyaline hairs. About the naked tips and especially near the edge of the growth of hairs a few basidia were observed with four spores about 4–5 μ wide: In time these growths which were all nearly vertical gave off branches similar to themselves, and finally on these stems, especially in the region of the naked tips, small conical papillae were formed. At the time it was thought that these growths would develop into normal plants of *A. Auriscalpium* but pilei never developed. Considering the resemblance of these growths in consistency and color to the *A. Auriscalpium* plants their association and the evidence of proliferation given by the Desmazieres specimens it seems probable that these were abnormal growths of the plant.

10. **GRANDINIOIDES** gen. nov.

Plant pileate, thin, membranaceous or subgelatinous; teeth minute, papilliform or subcylindrical, subciliate.

This genus differs from all the preceding in its subgelatinous or membranaceous substance and its exceedingly minute almost microscopic teeth. The latter feature suggests its relation to *Grandinia* as indicated by the name, but it differs from the latter in its consistency, its pileate form, and the teeth being more minute.

1. **Grandinioides flavum** (Swartz)

Peziza flava Swartz, Nov. Gen. et Sp. Pl. 150. 1788.

Hydnum flavum Berkeley, Ann. and Mag. Nat. Hist. 10: 380. 1843.

Hydnum brunneo-leucum B. & C. Trans. Linn. Soc. **22**: 129. 1859.

Plant pileate, subsessile, horizontal, reddish yellow; pileus round to reniform, concavo-convex, very thin, 2–3 cm. wide, 3 cm. long, less than 0.25 mm. thick when dry; surface glabrous, even, reddish ochraceous to chestnut-brown, or dark blood-red toward margin, whitish puberulent near point of attachment; margin thin, reflexed, crisped; hymenial surface pale to reddish ochraceous; stem scarcely evident, 3 mm. wide, broadening to a disc-shaped foot on the substratum about 6 mm. in diameter, whitish puberulent; substance fleshy, subgelatinous, subbrittle when dry; teeth short, minute, straight, terete, conical, subciliate, reddish ochraceous with pale tips, scarcely visible to the eye, decurrent to the base 125–160 μ long by 35–50 μ wide, 9 and 10 to one millimeter; spores not observed.

HAB.: On dead wood. Aug.

RANGE: Louisiana, *Langlois;* Cuba, *Wright.*

ICON.: Berkeley, *loc. cit. pl. 10. f, 8, a, b, c.*

Swartz's type specimen was from the West Indies. Berkeley says: "Swartz described the smooth outer surface of the pileus as the hymenium." I find no evidence in Swartz's descriptions that such was the case. He makes no mention of a hymenial or spore bearing surface, the essential characters of which were probably beyond his means of analysis, and I think he merely got the plant turned upside down in which position it closely resembles a cup-shaped peziza in form, color, and consistency.

The description given above has been made from dried specimens whose characters have doubtless changed somewhat from the fresh plant. On none of the specimens examined was I able to detect any spores. The plant needs to be carefully studied and more fully described from fresh material.

Hydnum brunneo-leucum B. & C. appears to be only a poorly developed form of *G. flavum.*

LIST OF EXSICCATI

The following exsiccati have been examined in the preparation of this paper:

1. **Allescher** and **Schnabl**: Fungi Bavarici.
2. **Cavara**: Fungi Longobardiae Exsiccati.
3. **Cooke, M. C.**: Fungi Britannici Exsiccati.
4. **Desmazieres, J. B. H. J.**: Plantes Cryptogames de France.
5. **de Thümen**: Mycotheca Universalis.
6. **Ellis, J. B.**: North American Fungi.
7. **Ellis, J. B.**, and **Everhart, B. M.**: North American Fungi, Second Series.
8. **Ellis, J. B.**, and **Everhart, B. M.**: Fungi Columbiani. See Shear.
9. **Fautrey, F.**: Herbier Cryptogamique de la Cote-d'Or (France).
10. **Herpell**: Sammlung präparirter Hutpilze.
11. **Krieger**: Fungi Saxonici.
12. **Mougeot, J. B.**, et **Nestler, C.**: Stirpes Cryptogamae Vogeso-rhenanae.
13. **Rabenhorst**: Fungi Europaei.
14. **Rabenhorst-Winter**: Fungi Europaei.
15. **Ravenel, H. W.**: Fungi Caroliniani Exsiccati.
16. **Ravenel, H. W.**: Fungi Americani Exsiccati.
17. **Roumeguere, C.**: Fungi Gallici Exsiccati.
18. **Roumeguere, C.**: Fungi Selecti Exsiccati.
19. **Shear, C. L.**: New York Fungi.
20. **Shear, C. L.**: Ellis and Everhart's Fungi Columbiani Continued.
21. **Sydow**: Mycotheca Marchica.
22. **Underwood, L. M.**, and **Cook, O. F.**: A Century of Illustrative Fungi.

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